# Using Activity Theory and Distributed Cognition to Understand the ICU Discharge Process

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# Using Activity Theory and Distributed Cognition to Understand the ICU Discharge Process

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A thesis submitted in fulfilment of the requirements for the degree of

**Doctor of Philosophy**

March, 2011

*To my parents*

# STATEMENT OF ORIGINALITY

This work has not previously been submitted for a degree or diploma at any university. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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Fengzhi (Frances) Lin

# ABSTRACT

Patient flow from ICU to the wards has been found to be problematic in many countries. It has been found that many discharges from ICU to ward were unsuccessful at the first attempt. Although after-hours ICU discharges have been found to be associated with increased mortality, after-hours discharges still take place in Australian ICUs. Refused and delayed ICU admissions have been associated with increased mortality, however statistics showed that there were still many patients unable to be admitted into ICUs in Australian hospitals. These findings indicate a resource constraint in Australian ICUs. Many researchers have implemented interventions to address these issues. The engagements of an ICU liaison nurse and an ICU outreach team to provide care to patients after ICU discharge were found to shorten ICU discharge delays and increase patient hospital survival.

It is against this context this study was carried out. The aim of this study was to explore and describe the patient discharge process from ICU to the wards in a metropolitan hospital in Australia. Distributed cognition and activity theory were used as theoretical frameworks and cognitive ethnography was used as the research method. Ethnographic data collection techniques including informal interviews, direct observations, and collecting existing documents were used.  A total of 56 one-on-one interviews were conducted with 46 participants; 28 discharges were observed; and numerous documents were collected during a three-month period. A triangulated technique was used in both data collection and data analysis to ensure the research rigour.

Under the framework of activity theory, the first phase of data analysis provided a detailed description of the ICU patient discharge process. Three discharge activity systems related to the ICU patient discharge were identified: the ICU discharge activity, the ward accepting ICU patient activity, and the hospital bed management activity. The subjects, objectives, tools, rules, community and division of labour for each discharge activity system were identified. Analysis of the interactions among these three discharge activity systems revealed that the ICU patient discharge process followed a strong routine. However, conflicting objectives, communication breakdowns, and teamwork issues within and between teams and departments were identified.

Five themes emerged from the second phase data analysis, based on the findings from the first phase of data analysis and informed by distributed cognition theory: *Hierarchical power and authority, Competing priorities, Ineffective communication, Failing to enact the organisational processes, and Working collaboratively to optimise the discharge process.* Issues with teamwork, cognitive processes, team members' interaction with cognitive artefacts, and how staff members' actions influenced the discharge process at the organisational level were identified.

Recommendations to improve the ICU patient discharge process focus on building shared situational awareness, improving teamwork, and redesigning and improving cognitive artefacts. This research demonstrated that activity theory and distributed cognition could complement each other in studying complex work systems in large healthcare organisations. Activity theory provided the view of the current state of the discharge activities at the local level, while distributed cognition gave a broader understanding of how the clinical practice evolved and was transformed in real settings at the organisational level.

This study formed Phase One of a larger study – *Enhancing Intensive Care Unit Discharges through Multidisciplinary Approaches*. The findings of this research informed Phase Two and Three of the larger study, which focused on implementing and evaluating an improved ICU patient discharge process.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

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# RESEARCH DISSEMINATION

## Awards

**1. Best Nursing Review paper:** Asia Pacific Critical Care Congress 2008 (Sydney)

**Lin, F.,** Chaboyer, W., & Wallis, M. (2009). A literature review of organisational, individual and teamwork factors contributing to the ICU discharge process. *Australian Critical Care, 22*, 29-43.

**2. Best Acute and Critical Care Research Poster:** Gold Coast Health and Medical Research Conference 2010

Lin, F., Chaboyer, W., & Wallis, M. (2010). *The influencing power of individuals' position and interdepartmental mistrust on ICU discharge process.* Poster presented at the Gold Coast Health and Medical Research Conference 2010, Gold Coast, Australia.

## Publications

1. Chaboyer, W., **Lin, F**., Foster, M., Retallick, L., & Richards, B. (Accepted March 2011). Redesigning the ICU nursing discharge process: a quality improvement study. *Worldviews on Evidence-Based Nursing*.

2. **Lin, F**., Chaboyer, W., & Wallis, M. (2009). A Literature Review of organisational, individual and teamwork factors contributing to the ICU discharge process. *Australian Critical Care, 22*, 29-43.

3. **Lin, F**., Chaboyer, W., & Wallis, M. (2009). Abstract: Exploring the ICU patient discharge process--From discharge decision making to clinical handover. *Australian Critical Care, 22*(1), 44.

## Conference presentations

**1. Lin, F.,** Chaboyer, W., Foster, M., Retallick, L., & Richards, B. (2010). *Redesigning the ICU nursing discharge process: a quality improvement study.* Paper presented at the ANZICS/ACCCN Intensive Care Annual Scientific Meeting 2010 Melbourne, Australia.

**2. Lin, F**., Chaboyer, W., & Wallis, M. (2010). *Exploring the ICU patient discharge process using activity theory and distributed cognition*. Paper presented at the International Nursing Conference. Beijing, China.

**3. Lin, F**., Chaboyer, W., & Wallis, M. (2010). *The implications of teamwork and communication for the ICU patient discharge process.* Paper presented at the BACCN National Conference 2010: Taking Pride in Practice. Southport, UK.

4. Invited speaker:
**Lin. F**. (2010). *Clinical communication – a safety issue*. Paper presented at the Critical Care Nursing Continuing Education Conference, Sydney, Australia

5. Invited speaker:
**Lin, F**. (2009). *ICU to ward handover: link for communication and patient safety.* Paper presented at the Critical Care Nursing Continuing Education Conference, Hobart, Australia.

6. Invited speaker:
**Lin, F**., Chaboyer, W., & Wallis, M. (2008). *A Literature Review of organisational, individual and teamwork factors contributing to the ICU discharge process*. Paper presented at the Asia Pacific Critical Care Congress, Sydney, Australia

7. **Lin, F**., Chaboyer, W., & Wallis, M. (2008). *Exploring the ICU patient discharge process-from discharge decision-making to clinical handover*. Paper presented at the Asia Pacific Critical Care Congress, Sydney, Australia

**International collaborations**

1. Rattray, J., Paul, F., Chaboyer, W., & **Lin, F** (2009). Grant application in preparation: *Ensuring Patient Safety: Exploring the (Dundee)Intensive Care Unit (ICU) discharge process*

2. Funded invited scholar at The Institute of Health and Care Sciences, University of Gothenburg in 2010. Presented the research, particularly the research methods and research findings to the Intensive Care and Emergency postgraduate students.

# CHAPTER ONE

# INTRODUCTION

Research related to the effective use of healthcare resources indicates that demand continues to outstrip supply, and that effective management of patient flow through the healthcare system continues to be a challenge for researchers and healthcare administrators (Drennan, Hart, & Hicks, 2008). This research study responds to the need for a deeper understanding of the complex Intensive Care Unit (ICU) patient discharge process. The aim of this qualitative study was to explore and describe the processes involved in discharging patients from ICU to the wards in a metropolitan hospital in Australia. Cognitive ethnography was the research method used with activity theory and distributed cognition providing theoretical frameworks. The findings may provide recommendations for practice improvement initiatives, including improvement in clinical practice, staff education and organisational management, which may subsequently improve patient outcomes, resource efficiency and service delivery.

This chapter provides an overview of the research undertaken under the following headings:

1. Overview of the study
2. Background
3. Aims of the study
4. Significance of the study
5. Key staff role categories
6. Structure of the thesis

## Overview of the Study

This study formed Phase One of a larger study – *Enhancing Intensive Care Unit Discharges Through Multidisciplinary Approaches*. Phases Two and Three of the larger study focused on implementing and evaluating an improved ICU patient discharge process based on the recommendations from this study. This research was carried out in a 580-bed Australian public tertiary teaching hospital. This qualitative study aimed to explore the ICU discharge process and its contributing factors, and to identify areas of potential improvement in resource use and patient safety.

In the initial phase, a broad review of the literature related to ICU services, resource management, staffing, patient factors, patient safety, and the theoretical frameworks applied in health care research was carried out. Based on the results of the initial broad literature review, a thorough review of literature on factors contributing to ICU patient discharge was carried out (Lin, Chaboyer, & Wallis, 2009). A further review of the theory and research on the ICU discharge process identified the theoretical framework, conceptual structure and the research method. Distributed cognition (Hutchins, 1995b) and activity theory (Engestrom, 1987) were used as theoretical frameworks for this research. The two theories complemented each other and offered the researcher not only a detailed description of how hospital staff carried out day-to-day ICU discharge activities, but also a broader view of how the complex ICU patient discharge process was transformed in the distributed cognitive system. Cognitive ethnography (Hutchins, 1995a; R. F. Williams, 2006) was used as the method of this study. Ethnographic data collection techniques were applied, including direct observation, informal interviews, and examination of existing artefacts and documents, with a focus on exploring the distributed cognitive processes in the discharge process.

## Background

Improving patient safety and patient outcomes has emerged as a priority for hospitals in the past 20 years. The United States (US) Institute of Medicine's (IOM) report *To err is human* provided a coherent set of directions that has set the agenda for patient safety worldwide (Kohn, Corrigan, & Donaldson, 2000). The IOM defines healthcare quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Committee on Quality of Health Care in America, 2001). The IOM definition suggests a broad approach measuring healthcare quality in terms of data-desired outcomes and related processes of care. In the book *Crossing the quality chasm: A new health system for the 21st century*, the IOM identified that patient care should be safe, effective, patient-centered, timely, efficient, and equitable (Committee on Quality of Health Care in America, 2001).

Regardless of the ever-increasing effort to prevent adverse outcomes in patient care in our healthcare systems, errors and near-misses do occur. Adverse Events (AE) occur in about 2.9-3.7% of US (Thomas et al., 2000), 10.8% of UK (Vincent, Neale, & Woloshynowych, 2001) and 16.6% of Australian hospitalisations (R. M. Wilson et al., 1995). Among these AEs, 51% in Australia (R. M. Wilson, et al., 1995) and 53-58% in the US (Thomas, et al., 2000) were found to be preventable. A later multinational study carried out in 205 ICUs around the world (including Australia) found that 319 (20.4%) patients experienced one or more episodes of AEs among 1,913 patients, and the occurrence of AEs in ICUs in different countries showed a common pattern (Valentin et al., 2006). The extra tests, treatments, prolonged hospital stays related to investigating and treating the effects of AEs have a very significant financial impact on the healthcare system. It has been estimated that AEs cost the UK £1 billion (Vincent, et al., 2001) and Australia in excess of $2 billion (Ehsani, Jackson, & Duckett, 2006; Runciman & Moller, 2001) per year. Despite much debate and analysis of cross-country variation on the rates of AE (Runciman et al., 2000; Valentin, et al., 2006), in an era of escalating healthcare costs and attempts at cost control, there is no doubt that a focus on quality and safety in health care is a trend that will continue into the future.

Adverse events in Australian ICUs have been studied. In one study, a total of seven Australian ICUs reported 610 AEs in the first year of the study (Beckmann, Baldwin, Hart, & Runciman, 1996). These incidents were grouped into five categories: drugs and therapeutics (28%); procedures, lines and equipment systems (23%); patient management and environment (21%); airway and ventilation (20%); and unit management (9%). These results were supported by the findings of a later study conducted by Capuzzo et al. (2005) in Italy and the US (Pronovost et al., 1999).

Improving clinical communication and patient safety has been high on the world's patient safety agenda. During a hospital admission, a patient often experiences a journey through various clinical departments such as emergency department and intensive care, being cared for by health professionals from different disciplines, and being transferred and handed over many times between care teams and departments. A surgical patient's journey from seeing the doctor, to having the surgery, being admitted to ICU, and eventually to the wards, could involve as many as eight patient handovers (Pilcher, Duke, George, Beiley, & Hart, 2007). This complex process could be a high risk to patient safety if communication breaks down at any stage. The World Health Organisation (WHO) has identified intensive care as one of the high-risk clinical areas that involve multidisciplinary teams and numerous patient handoffs. The WHO suggests that healthcare organisations should adopt a standardised approach to clinical handover in order to improve patient safety (World Health Organisation, 2007). The WHO launched a “High 5s” project in 2006, which aimed to reduce the occurrence of five major patient safety problems, one of which is about communication failures (World Health Organisation, 2010).

Demand for ICU services has been increasing continuously and persistently outstrips supply in Australian hospitals. During 2006-2007, there were 3,061 patients unable to be admitted into ICUs in Australia as a result of ICU bed and/or staff shortages (Drennan, et al., 2008). Patients undergoing major surgery often need to be admitted into ICU after the surgery. In 2006-2007, an average of 33% ICU admissions in Australian hospital ICUs were elective admissions, including post-elective surgery patients, while emergency admissions accounted for 66% of Australian ICU admissions (Drennan, et al., 2008). ICU resources are constantly stretched to the limit. ICU occupancy rates vary in Australia by geographic locations, for example, in 2003-2004 the rates were Victoria 79%, NSW 53%, and Queensland 64% (Higlett, Bishop, Hart, & Hicks, 2005). Some hospitals that cover a large population area reported high occupancy rates. In the hospital where this research was conducted, the bed occupancy was 97.9% in 2006 (Foster & Richards, 2006).  This high occupancy rate may indicate that the demand for ICU services in this hospital was high, or this may be related to poor patient flow within the hospital, which reduced resource efficiency.

A patient’s stay in ICU is only a section of his/her journey in the hospital during a hospital stay. After the stay in ICU, once their conditions are stabilised, most patients are discharged to the wards first before being discharged home from hospital. Therefore bed flow through ICU is often affected by hospital bed availability (Levin et al., 2003). Often patients cannot be admitted into ICU because it is full. This in turn may be because the ICU beds have been taken by the patients who were waiting for ward beds. This bed flow problem is often called discharge delay, bed block or outflow limitation (Chaboyer et al., 2006; Levin & Sprung, 2001).

Watts et al. (2005) found that 9% of critical care nurses claimed that lack of knowledge was one of the important factors impeding the discharge planning process in critical care. Studies also found that one of the main reasons that ICU patients could not be discharged was that ward staff lacked the knowledge and skills to look after patients with higher acuity (Beck, McQuillan, & Smith, 2002; Chaboyer, et al., 2006; Clarke, Abbenbroek, & Hardy, 1996; Levin, et al., 2003; Whittaker & Ball, 2000). Organisational interventions such as the use of an ICU liaison nurse to up-skill ward nurses (Chaboyer, et al., 2006) and the ICU outreach team to review patients after ICU discharge (C. Ball, Kirkby, & Williams, 2003) have been found to shorten discharge delays. However, findings from other research suggested that ICU nursing outreach team did not make any difference to discharge delays (T. A. Williams et al., 2010). Therefore a definite conclusion about the effectiveness of the ICU liaison nurse and discharge delays cannot be drawn.

It has been commonly agreed that hospital systems are typical distributed cognitive systems (Galliers, Wilson, & Fone, 2007; Hutchins, 1995a; Nemeth, 2008). An increasing number of studies has aimed to understand how cognition is distributed in a variety of clinical settings (Cohen, Blatter, Almeida, Shortliffe, & Patel, 2006; Hazlehurst, McMullen, & Gorman, 2007; Laxmisan et al., 2007). It has been found that the success of a healthcare organisation relies on each team member's clear and shared understanding of their collective objectives, effective teamwork of many professionals from various departments, and optimal communication by using a variety of tools to communicate vital information with each other (Nemeth, O'Connor, Klock, & Cook, 2003; Xiao, 2005). While dimensions of the ICU discharge process have been researched to some extent, the whole ICU patient discharge process as one of the distributed cognitive hospital processes has rarely been researched to date.

## The Aim of the Study

The aim of the study was to explore and describe the various processes involved in the discharge of patients from ICU to the wards. Direct observations and informal interviews were used to explore and describe the activities associated with patient discharges while documents were examined to determine critical information flows. The results provide an in-depth understanding of how cognition is distributed among the multiple participants in the multiple processes during the ICU patient discharge: where knowledge lies; how discharge decisions are made, transformed and shared among the participants; how each participant influences teamwork; and how the tools used by different participants at different locations impact on the discharge process. This understanding will hopefully lead to better clinical practice, staff education and organisational management, and further improvement in patient outcomes, resource efficiency and hospital service delivery.

## Significance

The ICU patient discharge process is complex, involving multiple professional disciplines including doctors, nurses, bed managers, ward clerks, and other hospital support teams. As illustrated by Cook and Rasmussen (2005), ICUs are often under forward pressure from areas such as emergency departments and operating theatres for ICU beds, and consequently, ICU patients are sometimes discharged to wards earlier than desired. Discharging patients is one way to relieve this pressure but clearly the risk of premature discharge must be managed. Interventions to improve teamwork and coordination among ICU staff have been found to optimise the ICU patient outcome (Jain, Miller, Belt, King, & Berwick, 2006). However, a thorough understanding of how cognition is distributed among multidisciplinary teams, how team members interact, and how artefact use influences the discharge process is needed. This understanding may be a first step in optimising discharge processes so as to reduce the risk of adverse events and poor patient outcomes even when patients need to be discharged earlier than would otherwise be desirable. However, most of the analytic research on ICU adverse events has been triggered by an incident that has already happened and the responses have been more *reactive* than *proactive*. From the current literature, little is known about the overall impact that the multidisciplinary involvement in the ICU patient discharge process has on the discharge process.

The importance of a better understanding of the ICU patient discharge process is significant for a number of reasons. First, better understanding of the ICU patient discharge process may discover optimal and suboptimal performance that influences resource efficiency in the process. Second, better understanding of the distributed cognitive process related to discharge can identify areas where the values and objectives of staff may not align, artefacts that may not work, and factors that impede the discharge process. Last, a better understanding of the discharge process may provide evidence for further improvement to ensure patient safety during this high-risk transitional period. The following section explores these areas in detail.

**Improving resource efficiency**

Research has shown that resource constraints have an impact on discharge decision-making and patient outcomes (Heidegger, Treggiari, & Romand, 2005; Tobin & Santamaria, 2006). This study is significant because by providing a deeper understanding of the ICU patient discharge process, it may identify areas that need improvement. This deeper understanding may lead to clinical improvements and contribute to improved resource efficiency.

Resource constraints in Australian hospitals have been an important issue (Australian Institute of Health and Welfare, 2010; Fisher, 1994). The Australian Institute of Health and Welfare ( 2010) reported that while the ageing population is increasing, the number of available hospital beds in Australian hospitals per 1,000 population declined from the 2004-2005 period to 2008-2009 period. However, during the same period, hospital separations (episodes of admitted patient care) increased 3.8% from 7 million to 8.1 million. In 2008-2009, the average waiting time for elective surgery in public hospitals increased to 34 days from 32 days in 2004-2005 (Australian Institute of Health and Welfare, 2007a, 2010). Patients undergoing major surgery often need ICU beds after the surgery (J. Martin, Anderson, Turton, Hart, & Hicks, 2006). This long waiting time could be caused by increased demand for hospital beds, shortage of hospital beds (particularly ICU beds), the shortage of qualified staff to perform the surgeries and care for the patients, or the suboptimal use of hospital resources. Hospital beds resource constraints have been a persistent problem in the last a few years, and thus effective use of existing hospital beds is essential to deliver the best services possible to patients.

Intensive care resources are expensive and in short supply in Australia (Higlett, et al., 2005). Australian ICU resources are significantly lower compared with other western countries. In 2002, the available ICU beds per 100,000 population was 25 in Germany, 24 in USA, 11 in Switzerland, and 10 in The Netherlands (Higlett, et al., 2005). By contrast, Drennan, Hart and Hicks (2008) reported that there were only eight ICU beds per 100,000 population in 2006-2007 in privately and publicly funded hospitals in Australia. ICU resources are also expensive commodities. In 2002-2003, in Australia, a group of researchers found that the average cost of an ICU bed was A$2670 per day and total stay per patient cost A$9852 (Rechner & Lipman, 2005). Although the severity of patient conditions in Australian ICUs is higher than in those countries with more ICU beds (Wild & Narath, 2005), this lack of beds relative to population and the high cost suggest that optimal use of the existing ICU beds is imperative in coping with the demand for ICU beds in Australia.

ICU bed shortage, a contributing factor to refused ICU admissions and after-hours discharge, has been found to be associated with increased mortality in Australia. When there are limited ICU beds available, the patient waiting for an ICU bed can be refused admission due to lack of resources. Refused admission has been found to be associated with increased mortality (Heidegger, et al., 2005; Sprung et al., 1999; Young, Gooder, McBride, James, & Fisher, 2003) and prolonged hospital stay (Kaboli & Rosenthal, 2003). Resource constraints may also be a contributing factor to after-hours discharge. Tobin and Santamaria found that the number of patients being discharged to the wards after-hours was about 22% on evening shift (3:00 pm – 10:00 pm) and 6% for night shift (10:00 pm – 8:00 am) (Tobin & Santamaria, 2006). Some research suggests that after-hours ICU discharge is associated with increased hospital mortality (Beck, et al., 2002; Goldfrad & Rowan, 2000; Tobin & Santamaria, 2006), but it is still happening because of the ICU bed pressures (Tobin & Santamaria, 2006).

ICU patients are sometimes unable to be discharged to the wards because of the lack of ward beds, a situation often called bed block. Williams and Leslie (2004) found that the average delay time for ICU patient discharge was 21.3 hours. Similarly, Levin (2003) found that 16% of planned ICU discharges were unsuccessful on the first attempt due to lack of ward beds. The factors causing discharge delays are diverse and complex. They may include lack of beds on the wards, lack of transport for the patient to go to other facilities or for the ward patient to be discharged, lack of medical cover on the wards, ward nurses' skill mix, and ward staffing levels (Metcalfe, Sloggett, & McPherson, 1997; G. Williams & Clarke, 2001; Zimmerman, Wagner, Draper, & Knaus, 1994). Discharge delays can have multi-dimensional effects, prolonging unnecessary ICU stay, taking up valuable ICU resources, and delaying ICU admissions.

Given this background, this study, by focusing on the processes and activities related to discharge, aims to provide a deeper understanding of the ICU patient discharge process as a whole, and how potential contributing factors such as resource waste, bed block, and discharge delays may influence the discharge process. This information will help hospital management to focus and respond to the problems and lead to the development of innovative strategies to reduce waste, and optimise the utilisation of hospital and ICU resources, which may ultimately contribute to increased ICU capacity and better patient outcomes.

## Improving teamwork and preventing errors

In addition to the possibility of discovering suboptimal processes in the discharge process, this study is significant because it may uncover issues in the distributed cognitive system that impede the discharge process. The ICU patient discharge takes place in a large distributed cognitive system that requires all team members to work in a coordinated manner, with a clear understanding of their roles and responsibilities, and utilising tools to aid communication and collaboration effectively (Hutchins, 1995a). The progressively more complex healthcare system and sicker patients, together with the multidisciplinary involvement in the multiple processes, can create the perfect ground for mistakes when issues arise in communication and teamwork among the healthcare team.

Optimal teamwork is essential for high quality healthcare service delivery and patient safety. The role of effective teamwork in accomplishing complex tasks has been well studied (Baker, Gustafson, Beaubien, Salas, & Barach, 2005; Kalisch, Curley, & Stefanov, 2007; Nemeth, 2007). Each team member has designated roles and responsibilities. In large organisations, teams make fewer mistakes when each team member understands their own roles and responsibilities (Salas & Cannon-Bowers, 2000; Sims, Salas, & Burke, 2004; Smith-Jentsch, Salas, & Baker, 1996). Team members need to work in a coordinated manner to realise the shared goals. Communication within and across teams can play a vital part in the effectiveness of the system and preventing errors (Flin, O'Connor, & Crichton, 2008).

Communication failures have been found to be the leading cause of serious patient harm worldwide. An analysis of 2,455 sentinel events reported to the Joint Commission for Hospital Accreditation in the US revealed that the primary root cause in over 70% of sentinel events was communication failures and, consequently, approximately 75% of these patients died (Joint Commission on Accreditation of Healthcare Organizations, 2004). The Australian Institute of Health and Welfare (2007b) reported that among the 103 reported cases of sentinel events in 2004-2005, 32 (31%) cases were caused by communication breakdowns and six by coordination problems among staff. In a study examining causes of human error in an ICU, Donchin et al. (1995) suggested that the problems of communication between the physicians and nurses could contribute to many dangerous human errors. In contrast, teamwork and communication training were linked to improved staff satisfaction and reduced turnover (Leonard, Graham, & Bonacum, 2004).

The impact of teamwork on ICU discharge and how cognition is distributed in the discharge process, however, have rarely been studied. How discharge decisions are made, shared and transformed, how the objectives of multiple teams align, how tools are used by various participants at various stages in the discharge process, and how team members understand the discharge policies and protocols influencing the discharge process, have not been explored. This research is important because it may identify gaps and breakdowns in the distributed cognitive process. The identification of these problems may provide recommendations for clinical practice improvement such as team skills training, and clarifying goals, roles and responsibilities. Thus it may lead to better staff training and more effective team coordination and communication, which may ultimately lead to reduced errors and improved patient outcomes.

**Improving patient outcome**

This research is also significant because a better understanding of the discharge process may further emphasise that this transitional period is high risk, a recognition that may improve patient safety. The WHO suggests that a patient's journey through the hospital is high risk because of the multiple processes and treatments involved, and the number of handovers and transfers that occur in a hospital stay (World Health Organisation, 2010).

Many researchers have studied ICU patient outcomes around the world. An early French study conducted in two sites identified that 31% of 382 ICU patients developed iatrogenic complications (Giraud et al., 1993). Another early study conducted in the US found that there were 194 adverse drug events per 1,000 patient days in two medical ICUs (Bates, Cullen, Laird, & et al, 1995). Kopp et al. (2006) found that 185 medication incidents occurred in a 16.5 day period in one US ICU with 132 of these being considered clinically significant medication errors. A small Italian study that examined 38 ICU patients over a four-week period identified 67 unintended events (Capuzzo, et al., 2005). In a US study, Rothschild and colleagues found that of 391 ICU patients, 79 (20.2%) had some form of AE (Rothschild, Landrigan, & Cronin, 2005). More recently, the Sentinel Events Evaluation (SEE) study, which involved 220 ICUs from 29 countries worldwide (including Australia), found that out of 1913 patients, 584 sentinel events occurred affecting 391 (20.4%) patients (Valentin, et al., 2006).

The occurrence of AEs in patients following ICU discharge has been the focus of ICU research for many years. Duke et al. (2004) found that 4.9% of ICU survivors died after discharge from ICU in an Australian hospital. Other research showed that post-ICU discharge hospital mortality ranged from 8.6% to 35% in other countries (Moreno, Miranda, Matos, & Fevereiro, 2001; Rubins & Moskowitz, 1988; L. Smith et al., 1999; Uusaro, Kari, & Ruokonen, 2003). Recent Australian studies demonstrated a 10-31% AE rate in patients three days after ICU discharge (Chaboyer, Thalib, Foster, Ball, & Richards, 2008; T. A. Williams, Leslie, Elliott, Brearley, & Dobb, 2010). An ICU patient's discharge condition at discharge, and discharge timing including premature discharge and delayed discharge, have been found to be associated with negative patient outcomes (Beck, et al., 2002; Chaboyer, Thalib, et al., 2008; Duke, et al., 2004; Moreno, et al., 2001; Rubins & Moskowitz, 1988; Tobin & Santamaria, 2006).

These studies show that AEs in ICU are not particularly rare around the world, including in Australia. However, most of these studies chose to examine the relationship between various clinical factors and AEs. The impact of ICU resource use, organisational structures and processes on the whole ICU patient discharge process has been given little attention.

The patient discharge from ICU to the wards has been found to be problematic, for reasons including lack of discharge planning in ICU (Chaboyer, Foster, Kendall, & James, 2002) and ward nurses' lack of skills to care for high acuity patients (Beck, et al., 2002; Whittaker & Ball, 2000). These vulnerable areas may potentially contribute to adverse events. To address these issues, some researchers implemented interventions to ensure patient safety during this transitional period. The presence of an ICU liaison nurse and a medical and/or nursing outreach team have been found to shorten discharge delays and improve patient outcomes by some researchers (C. Ball, et al., 2003; Chaboyer, et al., 2006). Exploring the discharge process provides evidence regarding whether these proven strategies are in place, or whether they are any issues with the implementation of these strategies. The recognition of this transitional period as high risk will emphasise strategies in place to reduce the negative impact ICU discharge has on patient outcomes.

In summary, the patient transfer process from ICU to the ward is emerging as an area that requires further understanding. The results of this study may provide a better understanding of the multidisciplinary ICU patient discharge process. It may inform further research to design a better process to improve the bed flow, the effectiveness of management and staff education, more effective use of resources, and better collaboration among disciplines. This may further eliminate the factors that contribute to AEs such as discharge delays and premature discharges, which may improve patient outcome. Role and responsibility clarification among the multidisciplinary team may reduce the waste in the process and therefore improve ICU resource efficiency. To optimise the effective use of available ICU resources, a multi-systems approach is needed to study the complex discharge process.

## Key Staff Role Categories

There are a number of staff roles that are frequently referred to in this thesis. Table 1 provides a brief explanation of the key role categories.

Table 1 Staff role categories (in alphabetical order)

| **Role name** | **Definition** |
|---|---|
| Bed cleaners | A hospital employee whose responsibility is to clean hospital beds after each ward patient discharge. |
| Bed Manager | The manager who coordinates patient admission and patient transfer between units. There is one person undertaking this function 24 hours/day in three shifts. |
| ICU Consultant | A medical practitioner who has been specifically trained in intensive care medicine. Intensive care specialists are formally certified in intensive care by completing the training requirements of the College of Intensive Care Medicine (CICM, formally Joint Faculty of Intensive Care Medicine (JFICM)). |
| Intern | A new medical graduate who is undertaking his/her first 12 months training (internship) in the hospital, prior to registration as a medical practitioner. |
| Nursing Educator | A Registered Nurse (RN) who is responsible for nursing and/or medical staff education in an allocated area. |
| Nursing Unit Manager (NUM) | A RN who is responsible for the management of a particular ward or unit. |
| Registered Nurse (RN) | A nurse who is on the register maintained by the Australian Nursing and Medical Council to practise nursing in Australia. |
| Registrar | A medical practitioner appointed to a specialist training position after the internship and resident training |
| Resident | A registered medical practitioner undergoing further training in a hospital after completing an internship but who has not commenced a recognised general practice or specialist training program. |
| Treating team | The doctors from different ward specialties that look after the patients before and/or after ICU discharge |
| Ward Clerk | A secretary who manages secretarial tasks within a unit or ward |
| Wardsman [sic] | A hospital employee whose responsibility is to assist other hospital staff with the patients' care, including transport of patients, transfer of patients, and manual handling within the hospital. |

## Structure of the Thesis

This thesis consists of seven chapters. Chapter One provides an introduction to the study. The background describes the context within which the ICU patient discharge process is situated. The aim and significance of the study are discussed, and the staff role categories are summarised.

Chapter Two reviews the literature on factors contributing to the ICU patient discharge process. Organisational factors, individual factors and teamwork actors were identified as contributing factors. It was concluded that a thorough understanding of the ICU patient discharge process was needed in order to make recommendations for clinical practice improvement.

Chapter Three discusses the theoretical underpinnings of this study. The theory and development of distributed cognition and activity theory, and the rationale for the application of these two complementary theories in this study are clarified.

Chapter Four describes the method used in the research, cognitive ethnography. Through the discussion of the differences between cognitive ethnography and traditional ethnography, the rationale of using cognitive ethnography is provided. Data collection processes, fieldwork, data analysis, research rigor, and ethical considerations are described in detail.

Chapter Five reports the findings of the first phase of data analysis, the description of the ICU discharge process. This phase of data analysis was informed by activity theory. The research findings are described under the headings of the six components of activity theory, the *subject, objective, tools, rules, division of labour, and community*. The demographic description of the participants is also given.

In Chapter Six, the findings of second phase data analysis, the themes that emerged through a distributed cognition framework are provided. Issues with teamwork, distributed cognitive processes, and team members' interaction with cognitive artefacts, and how staff members' actions influenced the discharge process outcome at the organisational level are identified.

Chapter Seven provides a discussion of the research findings with reference to distributed cognition, activity theory and relevant literature. Implications of this research for critical care clinical practice, research, and education are explored and recommendations are made. The contributions of this research in using activity theory, distributed cognition, and cognitive ethnography in healthcare research are conferred. The limitations of this research are discussed and conclusions are drawn.

## Summary

There has been a strong interest in research on patient safety in intensive care. Current research and literature on ICU patient discharge mostly focus on particular clinical areas and patient safety, such as the relationship between discharge times and patient mortality. After-hours discharge, discharge delays and bed block are examples of the factors that have been proved to contribute to adverse patient outcomes. However, the ICU patient discharge process as a whole has not been widely researched. ICU resources are a limited and expensive commodity in Australia and around the world. Optimising the utilisation of the resources, eliminating waste, and smoother, safer ICU patient discharge are imperative for better patient outcome. This study responded to the need for a deeper understanding of the multidisciplinary involvement in this complex process. The findings of this research may provide some much needed insight for healthcare researchers to improve patient outcomes, improve staff teamwork, and improve hospital and ICU service delivery.

# CHAPTER TWO

# LITERATURE REVIEW [1]

## Introduction

Improving patient safety and patient outcomes has emerged as a priority for hospitals in the past 20 years. The Institute of Medicine (IOM) suggests that data-desired outcomes and related processes of care should be investigated (Committee on Quality of Health Care in America, 2001). An adverse event (AE) is commonly defined as an unintended injury or harm to a patient, caused by suboptimal performance of healthcare providers or management rather than the disease process itself (Jorge, Salluh, & Bozza, 2009). Researchers are not only focusing on finding the causes of adverse events, but are also putting more emphasis on finding a solution to prevent adverse events in the present decade.

The ICU patient discharge process often starts from ICU admission when the planning of care is initiated, and does not conclude until the patient has been transferred to the wards, and the responsibility, accountability, and management of the patient has been completely handed over to the ward staff. This process can involve health professionals from many disciplines, including ICU specialist physicians and nurses, ward physicians and nurses, managers from different departments, ward

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[1] A manuscript was published based on this chapter (attached at the end of this thesis). The copy right holder permits the use of some or all of the article contents in the main author's thesis. The article citation: Lin, F., Chaboyer, W., & Wallis, M. (2009). A literature review of organisational, individual and teamwork factors contributing to the ICU discharge process. *Australian Critical Care, 22,* 29-43.

clerks, and support systems such as pathology and radiology. Many mini-processes are embedded within the ICU discharge process, such as the patient discharge decision-making process, preparation of patients for discharge from ICU, preparation of wards to accept ICU patients, and handover processes. As a result of the complexity of the ICU discharge process, problems can occur at any stage. The ICU discharge as part of ICU's routine activity has been shown to be associated with patient outcomes or hospital performance. Discharge delays (Chaboyer, et al., 2006; Levin, et al., 2003), poor clinical handover between ICU and the ward staff (Häggström, Asplund, & Kristiansen, 2009; Whittaker & Ball, 2000), and ward nurses' skill mix (Watts, Gardner, et al., 2005) have all been found to affect the discharge process.

It is in this context that a literature review of the ICU discharge process was conducted. This literature review critically analyses the current literature related to factors that influence the ICU patient discharge process in order to identify gaps in knowledge.

This chapter includes the following sections:

1. Search method
2. Introduction of Australian ICU services
3. Conceptualising ICU patient discharge
4. Organisational factors
5. Individual factors
6. Teamwork factors
7. Summary and recommendations

## Search Method

The literature search for this literature review started with a general search of publications related to ICU processes, including theoretical publications, primary research studies, abstracts, editorials, and government reports, policies, and guidelines. The literature was found by searching MEDLINE, Science Direct, Proquest, and Web of Sciences databases, and the “snow-balling” search of reference lists of found articles. Internet search engines including Google and Bing were also used to aid the search. Search terms used included ICU discharge, discharge process, factors influencing discharge, communication, teamwork, handover, discharge outcome, and various combinations of these terms.

From the initial broad review of the publications, an “ICU patient discharge process conceptual framework” was constructed. According to the conceptual framework, full publications related to organisational factors, individual factors, and teamwork factors in ICU patient discharge processes and interventions and training to address these three factors were identified with no limitation on the year of the publication. Theoretical literature related to these factors was reviewed. Abstracts were excluded. Patient factors, which have been the focus of extensive research (Moreno, Miranda, Matos, & Fevereiro, 2001; Smith et al., 1999), are excluded because the focus of this research was on identifying the healthcare practices that were amenable to change. The first search in 2008 resulted in the publication of a literature review, on which this review is based (Lin, et al., 2009) (Appendix 1). For the purpose of this literature review, a thorough search of the literature published from 2008 to 2011 was carried out by using the same search methods. Publications reviewed dated from 1993 to 2010.

Among the found publications, studies that explicitly aimed to explore organisational factors, individual factors and teamwork factors related to ICU discharge were grouped and listed into three tables. The studies that aimed to explore contributing factors to ICU patient mortality or adverse events after discharge, but did not have a focus on the discharge process, were not included in the tables. However, they were discussed in relation to the listed studies if the findings of such studies were related to ICU discharge. Three reports and 11 studies were about organisational factors and organisational interventions regarding ICU discharge (Table 2), seven studies about individual factors (Table 3), and four studies about teamwork factors (Table 4). Some studies focused on a number of these contributing factors, and therefore appear in more than one table. These tables are placed later in the chapter where the discussion of relevant contents occurs.

This study was carried out in an Australian ICU. In order to understand the literature on ICU discharge, an overview of Australian ICU services is provided.

## Australian ICU Services

Since the earliest beginnings of ICU development in Copenhagen in the early 1950s (Berthelsen & Cronqvist, 2003), patient care in ICUs has continued to develop in response to developments in medicine and surgery. Over time, intensive care has emerged as a distinct medical and nursing specialty with an emphasis on detailed monitoring and life support using sophisticated technology (Judson & Fisher, 2006). Types and specialties within ICUs have been further developed to provide specialised intensive care service to specific client groups, such as paediatric ICUs and cardiothoracic ICUs.

Australian ICUs and ICUs from some European countries and the US are operated differently. The acuity of patients is higher in Australian ICUs  and the nurse to patient ratio is 1:1 for ventilated patients (Wild & Narath, 2005). In contrast, in some European and US ICUs, there are often a large proportion of low acuity patients. The nurse to patient ratio is often 1:2 to 1:3, and the nurses are often supported by other health professionals such as respiratory therapists (Ogle, Copley, Bethune, & Parkin, 2004).

Many public and private Australian hospitals have ICUs. Similar to the rest of the world, Australian ICU types include general ICUs, Critical Care Units (CCU, which combine intensive care, coronary care units and high dependency units), paediatric ICUs (PICU), High Dependency Units (HDU), and specialty ICUs such as cardiothoracic ICUs, and many others (Drennan, et al., 2008; J. Martin, et al., 2006). There are three levels of ICUs according to the level of services they provide. Level 3 ICUs provide a full range of intensive care services and life support, while level 2 and level 1 ICUs can only provide limited services and in some instances patients have to be transferred to level 3 ICUs (Joint Faculty of Intensive Care Medicine, 2003). Drennan et al. (2008) report a total of 160 ICUs in Australia, within which the majority were level 3 and level 2 ICUs. These researchers surveyed 149 (response rate 93.1%) Australian ICUs, and found a high demand for ICU services in Australia, with 3,061 patients being unable to be admitted into ICU during 2006-2007.

A few Australian intensive care professional organisations organise and coordinate ICU accreditation, standards, quality control and ICU medical and nursing staff education. The Australian College of Critical Care Nurses (ACCCN) makes recommendations on nursing clinical practice and staff competency standards, and provides professional development opportunities such as training and conferences for ICU nurses (Australian College of Critical Care Nurses, 2002, 2007). Many Australian universities provide postgraduate educational programs for intensive care nurses. The Australia and New Zealand Intensive Care Society (ANZICS) provides guidance on ICU standards and quality control, while the College of Intensive Care Medicine (CICM, formerly Joint Faculty of Intensive Care Medicine (JFICM)) carries out ICU medical specialist training and accreditation (College of Intensive Care Medicine, 2011; Drennan, et al., 2008).

In terms of the way ICU patient treatments, admissions and discharges are managed, there are two types of ICUs: open and closed units. Australian ICUs adopt the closed unit model which specifies that ICU directors and consultants (intensivists) are the final decisions makers in patient admission, management and discharge (Joint Faculty of Intensive Care Medicine, 2003). In the open unit model, the consulting physician or surgeon is still responsible for the care in ICU and ICU specialists are asked to provide expert consultation. This open model is common in the US (Multz et al., 1998).

## Conceptualising the ICU Patient Discharge Process

In order to have a clear understanding on factors influencing ICU patient discharge, current literature on hospital and ICU adverse events, was critically analysed. In the past two decades there has been increasing interest in researching factors that may contribute to patient outcomes in hospitals (Pronovost, Wu, Dorman, & Morlock, 2002; Vincent, Taylor-Adams, & Stanhope, 1998). It has been identified that adverse events in complex healthcare systems may result from either active or latent failures (Reason, 1990, 1995). Active failures in a hospital setting are usually "committed" by the person closest to the patient, and this can lead to immediate adverse patient events. Latent failures, in contrast, refer to less apparent failures of organisation or design that contribute to the occurrence of errors (Agency for Healthcare Research and Quality, 2007). Latent failures can arise from management decisions that determine working conditions. Although active failures are much easier to identity than latent failures, identifying the latter could have a much larger effect on improving the working environment and patient safety.

Following this work, Vincent (1998) and Pronovost et al. (2002) identified a framework of six factors that may contribute to adverse events in intensive care clinical practice. The factors included: (i) *patient factors*, including clinical conditions, language, and social factors; (ii) *task factors*, including availability or use of protocols, test results, and accuracy of test results; (iii) *individual factors*, including health professional knowledge, skills, competence, fatigue, failure to follow established protocols/procedures, motivation and attitude, and physical and mental health; (iv) *teamwork factors*, including verbal or written communication during handover, routine care and crisis, supervision and seeking help, and team structure and leadership; (v) *working conditions*, including staffing levels, skills mix, workload, availability or maintenance of equipment, and administrative and managerial support; and (vi) *organisational and management factors*, including financial resources, time pressures, and physical environment. In a literature review, Reader et al. (2009) summarised that within a team performance framework, team communication, coordination, leadership and decision-making were elements of optimal team processes.

The ICU patient discharge process forms part of the ICU clinical practice, therefore the factors that influencing ICU practices may have impact on ICU discharge process. The ICU patient discharge process may begin with a patient's admission to ICU when some of the discharge paperwork is started, and does not finish until the responsibility and accountability for patient care are transferred to the ward, which normally happens when a patient is physically moved to the ward. Many factors may potentially cause problems in the discharge process. Discharge delay can result if no ward bed is available (Donchin, et al., 1995; T. A. Williams, Leslie, Brearley, Leen, & O'Brien, 2010) and premature discharge may occur when discharge decisions are influenced by pressure for ICU beds from other departments (Duke, et al., 2004). Based on the earlier frameworks, this literature review groups factors contributing to the ICU patient discharge process into four broad domains: organisational factors, individual factors, teamwork factors and patient factors (see Figure 1). Working conditions, and organisational and management factors, were considered as organisational factors. Each of these factors has its subcategories. As the aim of this literature review is to critically analyse current literature related to factors influencing the ICU patient discharge process and identify areas that could be improved in clinical practice, patient factors, a widely researched topic (Moreno, et al., 2001; L. Smith, et al., 1999), were excluded.

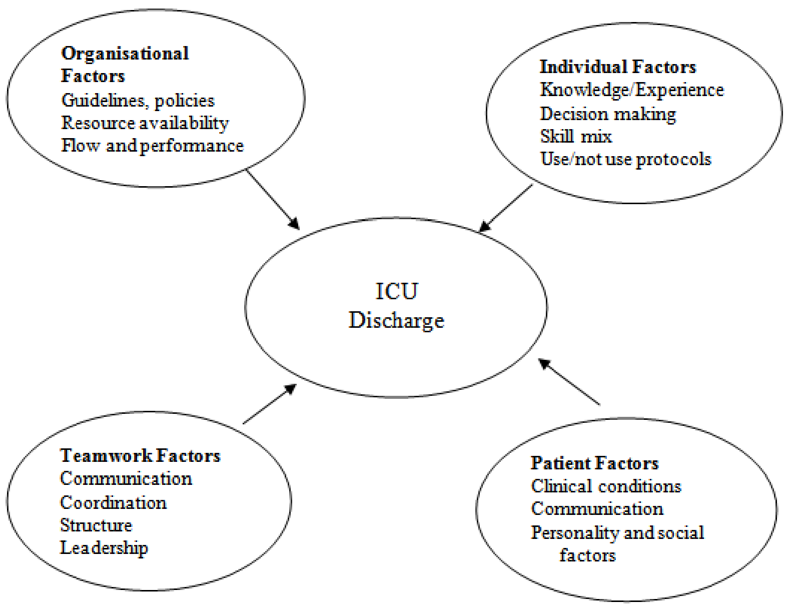



Figure 1 Conceptual model of factors contributing to the ICU patient discharge process

## Organisational Factors

Organisational factors, including guidelines and policies, resource availability, and flow and performance, have been the focus of many studies. Researchers and policy makers searching for a safer environment for patients and healthcare workers in the ICU have focused on a number of organisational factors, which are reviewed under the subheadings of guidelines and policies, resource availabilities, flow and performance, and organisational interventions aimed to improve flow and performance, and patient safety.

## Guidelines and policies

Only a few critical care organisations have written guidelines for the ICU patient discharge process. The Society of Critical Care Medicine (SCCM), from the US, provides detailed admission and discharge criteria, focussing on diagnostic groups, clinical judgement of the need to support or monitor organ functioning, objective physiological parameters, and the stability or instability of physical conditions (Society of Critical Care Medicine, 1999). According to the SCCM, ICU patients can be discharged when they no longer need intensive care monitoring. However, when there are limited ICU beds available, patients can be admitted and discharged by *triage* instead of through routine review processes (Society of Critical Care Medicine, 1999). Prioritising and triaging methods can be applied by deciding which patient will benefit more from ICU services. While triaging can be a strategy to free up much needed ICU beds (Garland, 2005), the SCCM recommends that only ICU directors have the authority to admit and discharge patients using this method as there are risks associated with triage, such as premature discharge (Duke, et al., 2004).

The Intensive Care Society (ICS), from the United Kingdom, has published *Guidelines on Admission and Discharge to ICU and High Dependency Unit* (Intensive Care Society, 1997). This document recommends the type of patient that should be admitted to the ICU; however, discharge criteria or guidelines are not specified. In Australia and New Zealand, the Joint Faculty of Intensive Care Medicine (JFICM, now called College of Intensive Care Medicine of Australia and New Zealand (CICM)) has issued a document on minimum standards for ICUs which specifies that all ICUs should have clearly defined policies for discharge of patients, but it does not have guidelines for ICU patient discharge (Joint Faculty of Intensive Care Medicine, 2003).

The ICS and SCCM guidelines share similar admission criteria which focus on patients' clinical needs, and in particular, the need to support organ functions, the diagnostic group, objective parameters and stability of physical condition (Intensive Care Society, 1997; Society of Critical Care Medicine, 1999). The SCCM guidelines provide much more detailed information regarding discharge than the ICS guidelines.

Analysis of these standards and guidelines showed that guideline use in ICUs was encouraged by professional organisations. The use of guidelines and policies in clinical procedures improves the utilisation and availability of ICU resources, and reduces ICU stay (Holcomb & Wheeler, 2001; Imhoff, 2002; Kern & Kox, 1999). Therefore, the use of guidelines and policies such as ICU patient discharge criteria may provide guidance to discharge decision-making. However, one American study indicated that only 18 out of 46 (39%) of ICUs had written discharge criteria (Pronovost, et al., 1999). A multi-centre ICU study found that only 22% of Swiss ICUs had written discharge criteria (Heidegger, et al., 2005). In contrast, protocols to follow strict clinical discharge criteria, such as that the patient could not be discharged from ICU unless there had been 48 hours of free of apnoea alarms, were found to contribute to ICU discharge delays (Perlmutter, Suico, Krauss, & Auld, 1998).

In relation to discharge by triage (Society of Critical Care Medicine, 1999), patient illness severity must be taken into account to ensure patient safety. Some researchers have found an association between higher illness severity scores at discharge (e.g. APACHE II) and increased mortality after ICU discharged (Moreno, et al., 2001; L. Smith, et al., 1999). Some may argue that this may relate to the fact that some patients are discharged on palliative care, “Do Not Resuscitate” orders. However, Beck et al. (2002) argue that night-time discharge and high discharge TISS scores (Keene & Cullen, 1983) are significant indicators of premature discharge.

In addition, the lack of agreement about ICU discharge decision-making (Heidegger, et al., 2005) indicates a need for more research to clarify ICU discharge criteria. The reason some units do not use written discharge guidelines (Pronovost, et al., 1999) may be that the recommendations made by the professional organisations seem to be too broad and subjective and may not be clinically implementable. Thus, further research on the effectiveness of using discharge guidelines, and on the relationship between discharge guidelines, discharge decision-making, and patient outcomes is needed to safeguard the ICU patient discharge practice.

**Empirical studies of organisational factors**

Table 2 summarises 11 studies related to organisational factors on ICU patient discharge. Among the publications, the majority of the studies were single-site studies, with the exception of the multi-site studies of Pronovost et al. (Pronovost, et al., 1999) from the US and William et al. (2004) from Australia. Because some studies cover more than one organisational factor, the table lists the studies in alphabetical order instead of categorising them into subcategories. Guidelines and policies published by professional organisations are not listed in the table. This section provides a review of how organisational factors influence the ICU discharge process by analysing these 11 publications, in combination with current theoretical and empirical literature related to these factors.

Table 2 Studies related to organisational factors influencing the ICU discharge process

| Author (year) Country | Research Method and Instruments | Setting and Sample | Findings | Limitations |
|---|---|---|---|---|
| Chaboyer et al. (2006)<br><br>Australia | Before and after interventional design.<br>Intervention: ICU liaison nurse.<br>Measurement:<br>LOS†, and hours of discharge delay from the hospital clinical database. | Patients in ICU ≥ 3 days in a tertiary referral hospital.<br>Control group: 101 patients<br>Intervention group: 85 patients | 1. Discharge delays were significantly higher in the control group.<br>2. 36.6% of patients had delay of at least 2 hours; the risk of delay in the control group was 3.2 times more than the intervention group.<br>3. 22% of patients experienced delay of at least 4 hours and the risk of delay was 2.5 times more than the intervention group. | 1. Examination of reasons for discharge delays and ICU exit block is needed to verify the findings.<br>2. Single site. |
| Chaboyer et al. (2004)<br><br>Australia | Block interventional study.<br>Intervention: ICU liaison nurse<br>Instruments:<br>Surveys including perceptions of discharge planning scale, general perceived self-efficacy scale. | Nurses in one teaching hospital ICU: pre intervention 59 nurses responded (89%), and post intervention 59 nurses responded (91%). | Post intervention<br>1. More nurses disagreed with the statement of discharge planning in ICU was premature.<br>2. More nurses agreed that ICU nurses have responsibility to initiate and implement discharge planning; that the ICU doctors gave enough directions on starting discharge planning; that they understood it better.<br>3. No difference to self-efficacy to discharge planning in ICU. | 1. Single site<br>2. Outcome not measured. |
| Crocker & Keller (2005)<br><br>UK | Prospective action research.<br>Intervention: A new process led by the nurse caring for the patients in HDU.* A discharge tool was developed and audited. | 10-bed HDU.<br>Multidisciplinary team working in the HDU. | 1. There was a considerable delay in discharging patients pre-intervention.<br>2. Perceived benefits after intervention: 1) Patient transfers were smoother; 2) Communication was more efficient. | 1. The benefit was yet to be evaluated.<br>2. Only action phase is reported in this paper.<br>3. Single site. |
| Heidegger et al. (2005)<br><br>Switzerland | Prospective survey.<br>Questionnaire about ICU structure and organisation.<br>Five clinical situations were presented with request to assign a discharge disposition. | Medical directors of 55/73 adult ICUs affiliated with the Swiss Society of Intensive Care Medicine participated, representing 75% of all adult Swiss ICUs. | 1. Responsibility for patient management was assigned in 91% of centres to the ICU team directing patient care.<br>2. Only 22% of responding centres used written discharge guidelines.<br>3. Half of the respondents used at least 10 of 15 proposed criteria to decide patient discharge. | How the lack of agreement relates to patient outcome was not investigated. |

| Author (year) Country | Research Method and Instruments | Setting and Sample | Findings | Limitations |
|---|---|---|---|---|
| Levin et al. (2003)<br><br>Israel | A prospective observational study.<br>Measurements:<br>Age, APACHE II[%] scores at discharge, and discharge delay. | 11-bed general ICU of a 750-bed urban university hospital.<br>All ICU patients judged appropriate for discharge by the ICU attending physician during a 6-month period.<br>856 attempted discharges in 706 patients were analysed. | 1. 703 (82%) discharges were successful within 24 hours.<br>2. 3.33% unsuccessful discharges were deferred because of medical deterioration.<br>3. 21% at the request of the ward physicians or nurses.<br>4. 46% because of administrative difficulties (lack of ward bed space or disagreement over admitting service). | 1. Single site.<br>2. Factors in other departments were not measured. |
| Permulter et al. (1998)<br><br>USA | A prospective interventional study.<br>Meetings to identify discharge delays and their causes.<br>Measurement: estimated cost savings for 1 year. | One neonatal ICU. All admissions from January 1994 to December 1995. | 1. Some discharge delays were caused by factors beyond the team's control.<br>2. Some were caused by rigid discharge criteria such as 48 hours free of apnoea alarms.<br>3. Identification of the problems and subsequent interventions resulted in a cost saving of $194,745. | Single site. |
| Pronovost et al. (1999)<br><br>USA | Observational study.<br>Retrospectively collected data from patients' charts.<br>Prospectively collected ICU data.<br>32-item medical directors survey about staffing, etc.<br>Measures: in-hospital mortality, and hospital and ICU LOS. | All Maryland hospitals that performed AAA [#] between 1994 and 1996.<br>2,987 patients' charts reviewed.<br>39/46 (85%) ICU medical directors completed survey. | 1. ICU characteristics independently associated with increased hospital LOS for the AAA cases that:<br>a. had an ICU nurse/patient ratio of less than 1:2 in the evening;<br>b. did not have monthly review of ICU morbidity and mortality;<br>c. and routinely extubated in the operating room.<br>2. 18/46 had written ICU admission and discharge criteria. | 1. Coding accuracy<br>2. Adjustment for severity of illness<br>3. Reliability and validity of survey instrument. |

| Author (year) Country | Research Method and Instruments | Setting and Sample | Findings | Limitations |
|---|---|---|---|---|
| Williams et al. (2010) a<br><br>Australia | Interventional study<br>6 month before intervention: Sep-March 2000-2001 (previous study)<br>Post intervention period: June-Nov 2008<br>Intervention: ICU nursing outreach team<br>Measures: discharge delays | One level 3 general ICU.<br>Pre intervention: 607 discharges in 2000-2001<br>Post intervention: 516 discharges in 2008 | 1. 31% of discharges were delayed >8hours post intervention. After-hours discharge occurred more frequently, and morality rate was higher in this group.<br>2. Discharge delays increased 6% from 2001 (pre intervention).<br>3. Most common reasons for delay were: no ward bed or delay of bed availability (reduced to 53% from 80% in 2001), or medical concern (increased to 24% from 9% in 2001). | 1. Single site<br>2. Time gap between the pre and post intervention periods may influence the results. |
| William et al. (2010)b<br><br>Australia | Prospective interventional study<br>Intervention: ICU nursing outreach team<br>Measures: LOS; ICU readmissions; discharge delays. | 3 adult teaching hospital ICUs.<br>1,566 discharges in pre intervention period<br>1,435 post intervention. | 1. No difference to LOS.<br>2. No significant differences to ICU readmission.<br>3. More patients were discharged after-hours after intervention but no significance.<br>4. 36% experienced discharge delays >8hours in post intervention group. Pre intervention group data was not available.<br>5. Most common reasons for delay were: no ward bed or delay of bed availability (45%); staff shortage (4%); skill mix (2%) | 1. Although multicentre, hospital processes could vary, which could influence the results.<br>2. Post intervention period is short<br>3. No comparison of discharge delays between the pre and post intervention. |
| Williams et al. (2010)c<br><br>Australia | Prospective interventional study.<br>Intervention: a Discharge Plan to facilitate ICU discharge<br>Outcome measurements: document compliance rate; AEs within 72 on the ward post ICU discharge | One 22-bed ICU in a teaching hospital.<br>Discharges 6 months before (167 patients) and after (169 patients) intervention. | 1. 97% compliance rate.<br>2. There was an increase of AEs after intervention from 10% to 22.7% (67 AEs total).<br>3. After intervention: 63% of AEs were not preventable; 37% were preventable (a decrease from 65% before intervention). Patient had AEs experienced 6 days hospital LOS. | Single setting<br>Increase of AEs after intervention needs further research to explain this finding. |

| Author (year) Country | Research Method and Instruments | Setting and Sample | Findings | Limitations |
|---|---|---|---|---|
| Williams & Leslie (2004)<br><br>Australia | Prospective cross-sectional study (observational). Review of nursing coordinators' patient list records, and ICU patient lists.<br>Measure: discharge delay. | All patients admitted into a 22-bed ICU (medical and surgical) in a metropolitan tertiary teaching hospital of 955 beds over a 6-month period (652 patients) | 1. Delayed discharge was defined as patient not discharged after 8 hours of being considered by ICU staff as suitable for discharge.<br>2. 176 patients (27%) were delayed.<br>3. Reasons for discharge delay: unavailable beds (81%); patients' condition severity; lack of single room for infection control purposes; lack of transport to other facility. | Single site. |

[#]AAA: Abdominal aortic aneurysm surgery
[%]APACHE II: Acute Physiology and Chronic Health Evaluation II
*HDU: High Dependency Unit
[†]LOS: length of stay

Note: The first author of three of the publications by Williams et al, and the year of publication are the same. To differentiate the tree publications, full citations are listed here.
a: Williams, T. A., Leslie, G. D., Brearley, L., Leen, T., & O'Brien, K. (2010). Discharge delay, room for improvement? *Australian Critical Care, 23*(3), 141-149.
b: Williams, T. A., Leslie, G. D., Finn, J., Brearley, L., Athifa, M., Hay, B., et al. (2010). Clinical effectiveness of a critical care nursing outreach service in facilitating discharge from the intensive care unit. *American Journal of Critical Care, 19*, e63-e72.
c: Williams, T. A., Leslie, G. D., Elliott, N., Brearley, L., & Dobb, G. J. (2010). Introduction of Discharge Plan to Reduce Adverse Events Within 72 Hours of Discharge From the ICU. *Journal of Nursing Care Quality, 25*(1), 73-79.

## Resource availability, patient flow and performance

Resource availability, patient flow and performance have been found to have an impact on patient outcome (T. A. Williams, Leslie, Brearley, et al., 2010) and to influence discharge decision-making (Sprung, et al., 1999). Night-time ICU discharge still exists (Drennan, et al., 2008), despite much debate about its association with increased mortality (Duke, et al., 2004; Hanane, Keegan, Seferian, Gajic, & Afessa, 2008; Pilcher, et al., 2007). This section reviews the literature on these issues and their relationship to the ICU discharge process.

Studies focused on ICU patient mortality have identified after-hours discharge as a contributing factor to patient mortality. Resource shortages has been found to be associated with night-time discharge, which has been found to be associated with increased mortality (Beck, et al., 2002; Duke, et al., 2004; Goldfrad & Rowan, 2000; Pilcher, et al., 2007; Priestap & Martin, 2006; Tobin & Santamaria, 2006). Goldfrad and Rowan (2000) found that patients discharged from ICU at night experienced 2.5-fold greater mortality than patients discharged during the day. They also found that only 44.1% of patients discharged at night were fully ready to be discharged, compared with 86.3% of those discharged during the day. In an Australian study, Duke et al. (2004) found that patients discharged to the ward during the night shift had higher Acute Physiology and Chronic Health Evaluation (APACHE II) scores (Kohn, et al., 2000) and crude mortality. Their research results suggest a higher prevalence of delayed discharge (37%) and premature discharge (2%) associated with night-shift discharge. A recent study conducted by Pilcher et al (Pilcher, et al., 2007), which analysed data from ANZICS Adult Patient Database, found that 18.2% of patients were discharged from ICU after-hours, and that the hospital mortality rate for the patients discharged after-hours was significantly higher than for those discharged during the day. This study can be considered representative of Australian and New Zealand discharge mortality because the database includes about 70% of all Australian and New Zealand ICUs. In contrast to these findings, Hanane et al ( 2008) found no significant difference in mortality between patients discharged at night-time and during the day. However, in this study, the reasons for night-time discharge were not explored.

Despite the research suggesting that after-hours discharges are associated with increased mortality, after-hours discharge still takes place, possibly as a result of resource shortages in hospital ICUs. In one Australian ICU, between 1992-2002, the number of patients discharged to the wards after-hours was 22% on evening shift (1500-2200 hours) and 6% on night shift (2200-0800 hours) (Tobin & Santamaria, 2006). The average number of after-hours discharges in Australian ICUs appears to be increasing over the past a few years. In 2006-2007, out of 114,726 episodes of ICU care within a 12-month period in 149 Australian ICUs, 10,819 cases (9.4%) were discharged after-hours, an increase from 4.3% of the 2004-2005 period (Drennan, et al., 2008; J. Martin, et al., 2006). Although it is always possible that changes in the number of units submitting data to the annual survey may be responsible to some of these differences. Discharging patients after-hours may indicate the pressure on ICU beds, and may be unavoidable due to resource constraints.

At other times, ICU discharge delays occur because of the resource constraints on the wards. Williams and Leslie (2004) found that 81% of delayed ICU discharges were due to a lack of available beds in the hospital and average delay time for ICU patient discharge was 21.3 hours. Levin (2003) found that 16% of planned ICU discharges were unsuccessful at the first attempt due to lack of ward beds. It appears that ICU patient discharge and bed flow is largely influenced by the resource constraints in both ICU and the wards. Recent research suggests that discharge delays in Australian ICUs continue to be a problem (T. A. Williams, Leslie, Brearley, et al., 2010; T. A. Williams, Leslie, Finn, et al., 2010)

The availability of resources not only affects the number of patients a unit can admit, but may also influence the discharge decision-making process in ICU (Sprung, et al., 1999). Sprung et al. suggested that better management of ICU beds and more hospital beds could improve the decision-making process by helping the decision makers to focus on the patient's clinical condition rather than on the availability of hospital resources. Understandably, ICU patient outflow can be influenced by a lack of resources in other parts of the hospital, including a lack of single rooms in the wards, lack of transport for the patient to go to another facility, or a lack of ward-based clinical decision-making resulting from a lack of medical cover on the wards, ward nurses' skill mix and/or ward staffing levels (Beck, et al., 2002; Metcalfe, et al., 1997; G. Williams & Clarke, 2001; Zimmerman, et al., 1994).

These issues suggest a few questions that need to be answered in future studies. First, there have been various definitions of after-hours discharge, or night-time discharge. Most studies defined after-hours discharge according to local clinical practice and shift arrangements (Goldfrad & Rowan, 2000; Tobin & Santamaria, 2006; T. A. Williams, Leslie, Finn, et al., 2010). Second, the reasons that patients are discharged after-hours need to be explored in relation to patient outcomes. As Brasel (2008) discusses in an editorial, there are two groups of patients in the after-hours ICU discharge population. One group consists of patients who are discharged to the wards after-hours because ward beds are not available during business hours. The other group consists of patients discharged using the triage method because of bed pressures, and these may be premature discharges. The latter group of patients may not be ready to be discharged and would not to be discharged normally if not for bed pressures. Adverse events can occur in this group of patients as ward staffing levels are lower than in intensive care units, and patient monitoring is necessarily less exact. Consequently, rapid deterioration in a patients' condition may not be observed in a timely manner.

However, Brasel (2008) does not mention that there may be routine after-hours discharges. This third group of patients may be deemed ready for discharge during routine after-hours reviews and subsequently discharged after-hours. Goldfrad and Rowan's study has strength in this regard because they identified the first two groups (Goldfrad & Rowan, 2000). It is likely that larger scale studies may be needed to investigate outcomes in these three groups in order to fully understand how ICU discharge practices, including discharge delay, after-hours discharge, and discharge decisions made by triage, impact on patient outcome. Furthermore, studies that collect and analyse critical care hospital patient flow patterns, and model patient flow to proactively utilise critical care capacity, may further aid discharge decision-making (Shahani, Ridley, & Nielsen, 2008).

## Organisational interventions

Many researchers have implemented interventions to optimise the ICU discharge process in order to improve patient safety and make more resources available for those patients who desperately need ICU care (C. Ball, et al., 2003; Chaboyer, et al., 2006; Perlmutter, et al., 1998; T. A. Williams, Leslie, Elliott, et al., 2010). Analysing the ICU patient discharge process and removing unnecessary steps have been found to improve interdepartmental communication (Crocker & Keller, 2005). Identification of reasons that contributed to discharge delay and implementing new strategies have been found to improve the discharge process and reduce cost (Perlmutter, et al., 1998). The use of the ICU liaison nurse and/or an outreach team has been found by some researchers to shorten discharge delays and facilitate the ICU discharge process (Chaboyer, et al., 2006; Green & Edmonds, 2004), while others found no association between the ICU nursing outreach team and discharge delay (T. A. Williams, Leslie, Finn, et al., 2010).

Studies analysing the ICU patient discharge process, and identifying problems and strategies to solve these problems have found a variety of approaches to be effective in improving the discharge process. Crocker and Keller (2005) reported that after removing unnecessary steps in the patient discharge process, such as too many handovers, communication among staff improved and the patient journey was much smoother. Perlmutter et al. (1998) trialled a programme to identify the causes of discharge delays in one American neonatal ICU. They found that making changes to rigid discharge protocols, such as not allowing patients to be discharged unless they had been free of apnoea alarms for 48 hours, shortened the discharge delays. Identification of problems and implementation of strategies to improve the patient discharge process reduced discharge delays and resulted in cost savings of $184,745 in one year for the hospital.

Interventions related to the tools used in the ICU discharge process have been found to make a difference to patient outcome. Williams et al. (2010) introduced a discharge plan, which applied a multi-disciplinary approach to facilitate discharge.

The plan was started on a patient's ICU admission, updated by nurses during the patient's ICU stay, and completed by both ICU nurses and doctors on patient discharge. Ward staff receiving the discharged ICU patients used the document as a tool to gather patient information. The researchers found that the introduction of the discharge plan reduced preventable adverse events from 65% to 37% (out of all adverse events that occurred after patient discharge). However, there was an unexplained increase in the total number of adverse events that needed to be further investigated.

There is still debate about the effectiveness of the ICU liaison nurse in the ICU discharge process (Endacott, Eliott, & Chaboyer, 2009). The use of an ICU liaison nurse in an Australian ICU to coordinate patients' transition from ICU to ward and ensure the continuity of patient care was found to significantly reduce discharge delay (Chaboyer, et al., 2006), and to improve ICU nurses' perceptions of discharge planning (Chaboyer, et al., 2004). Similarly, the use of a medical and/or nursing ICU outreach team, trialled by various researchers in the UK, was shown to decrease the patient hospital mortality rate (C. Ball, et al., 2003; Pittard, 2003; Priestley et al., 2004). Ball et al. (2003) found that the ICU outreach team, that reviewed patients on the wards after discharge from ICU, increased the patients' hospital survival by 6.8%, although this trend did not reach statistical significance.

In contrast, other Australian studies found that the introduction of the ICU nursing outreach team (a nursing team similar to the liaison nurse role) either increased discharge delays (T. A. Williams, Leslie, Brearley, et al., 2010), or made no difference to discharge delays (T. A. Williams, Leslie, Finn, et al., 2010). The conflicting results from these interventional studies on ICU liaison nurse use may be associated with the following factors. First, the organisational characteristics of the research settings may vary and bed management practices may differ. Some may have better organisational strategies in place, and therefore the liaison nurse did not make any difference. Some research settings had ICU liaison service 24 hours a day, every day of the week, while others only had a liaison nurse during the day for eight hours from Monday to Friday (Chaboyer, et al., 2006; T. A. Williams, Leslie, Brearley, et al., 2010; T. A. Williams, Leslie, Finn, et al., 2010). Williams, Leslie, Finn, et al. (2010) explain that because their study was multi-centre, the variations of discharge practices among the three hospitals may have contributed to their result.

Second, methodological issues may impact on research results. One issue is that before and after research designs are weaker sources of evidence when compared with random controlled trials. All the interventional studies listed in Table 3 used the before and after design. Another issue, as explained by Williams, Leslie. Brearly et al. (2010), is that there was a seven-year gap between the two comparison periods. The change in nursing clinical practices and hospital management practices in the research setting could contribute to the conflicting result. Another factor that may have contributed to the conflicting results was variation in the length of time seen as constituting discharge delay. Defined as the period between when an ICU patient was deemed ready for discharge and when the patient was actually discharged, two to four hours was considered discharge delay by some researchers (Chaboyer, et al., 2006) while others used eight hours (T. A. Williams, Leslie, Finn, et al., 2010).

Although the impact of a liaison nurse on discharge delay and patient outcomes is still unclear, researchers agree that this intervention delivers benefits in improved knowledge and skills support for ward nurses, and improved communication between ICU and ward nurses (Endacott, et al., 2009). Future studies to measure the effectiveness of the ICU liaison nurses may be needed.

In summary, organisational factors may influence the ICU discharge process. The effectiveness of the use of discharge guidelines and discharge criteria is unclear, and discharge guidelines are generally underused in clinical practice. Resource shortage in Australian ICUs is still a challenge. Many studies have focused on the impact of discharge practices and patient outcomes, such as after-hours discharge and discharge delays; however, disagreements remain. Organisational interventions that analysed the discharge process and implemented strategies to solve problem areas proved to be effective in improving the discharge process. However, there is still debate about the effectiveness of the ICU liaison nurse. Further research addressing gap areas is needed.

## Individual Factors

Healthcare professionals' decision-making, knowledge, experience, staff skill mix and use or non use of organisational protocols could all influence organisational performance. Research indicates that individual factors related to the multidisciplinary team can play a vital role in many stages of the ICU discharge process. Serious adverse events often involve individual errors together with a few system failures, such as work environment, organisational levels, and teamwork (Pronovost, et al., 2002). Table 3 summarises the seven studies that address individual factors contributing to the ICU discharge process.

Table 3 Studies related to individual factors contributing to ICU discharge process

| Author (year) Country | Research Method and Instruments | Setting/Sample | Findings | Limitations |
|---|---|---|---|---|
| Brand (2006)<br><br>UK | Ethnography.<br>Direct observation and unstructured interviews. | Nurses from one adult HDU. | Themes:<br>1. Nurses took a submissive role in the nurse-doctor relationship in order to avoid conflict.<br>2. Nurses took a holistic approach, which was different from other health professionals.<br>3. Nurses had substantial responsibility in bed management and were more proactive in decision-making, especially when there was pressure on beds.<br>4. ICU nurses were uncomfortable with discharge decision-making, even though they liked to contribute. | Single setting. |
| Bunn (2007)<br><br>New Zealand | Exploratory study<br>Focus groups | 9 ward nurses in three groups | Themes:<br>1. Documentation as a continuation of patient care: problems with discharge documentation<br>2. They forget what it's like: ICU nurses lack of understanding of what patients ward nurses could care for; lack of experienced nurses on the wards. | Single setting. |
| Chaboyer et al. (2005)<br><br>Australia | Prospective qualitative case study.<br>Semi-structured in-depth interviews. | 10 ward nurses from one tertiary hospital that utilises an ICU liaison nurse. | Three major themes emerged:<br>1. The role behaviours of the liaison nurse included the professional characteristics of the individual and the primacy of clinical liaison as a role descriptor.<br>2. Contextual demands were environmental characteristics relevant to providing patient, family and staff support.<br>3. Outcomes of the role were perceived to include environmental preparation and education. | Small sample.<br>Single setting. |
| Heidegger et al. (2005)<br><br>Switzerland | Prospective survey.<br>Questionnaire about ICU structure and organisation.<br>Five clinical situations were presented with request to assign a discharge disposition. | Medical directors of 55/73 adult ICUs affiliated with the Swiss Society of Intensive Care Medicine participated, representing 75% of all adult Swiss ICUs. | 1. Discharge practices varied in hospitals with different level of resources.<br>2. The ICU director's level of experience was not associated with the number of criteria used. In the five clinical scenarios there was wide variation in discharge decision. | How the lack of agreement relates to patient outcome was not investigated. |

| Author (year) Country | Research Method and Instruments | Setting/Sample | Findings | Limitations |
|---|---|---|---|---|
| Watts et al. (2005)<br><br>Australia | Prospective exploratory study.<br>31-item questionnaire.<br>Semi-structured interviews. | 218/502 critical care nurses from ACCCN Victorian database completed survey.<br>13 nurses were interviewed. | Important factors that contribute to poor discharge planning in ICU were:<br>1. 33% due to inadequate communication.<br>2. 30% unplanned discharges.<br>3. 17% lack of time.<br>4. 9% lack of knowledge.<br>5. 7% continuity of staff. | Sample was ACCCN* members only. |
| Whittaker & Ball (2000)<br><br>UK | Exploratory pilot study.<br>Questionnaires.<br>Semi-structured interviews. | Sample: Nurses (RN and enrolled) from two wards receiving adult ICU patients in a large teaching hospital.<br>Questionnaires were sent to nurses (Response rate: 36%.)<br>7 nurses were interviewed. | Lower grade nurses felt “a sense of dread” and “depressed” when receiving ICU patients due to insufficient information given to them by ICU nurses. | 1. Single setting.<br>2. Pilot study |
| Williams & Leslie (2004)<br><br>Australia | Prospective cross-sectional study (observational)<br>Review of nursing coordinators’ patient list records, and ICU patient lists.<br>Measure: discharge delay | All patients admitted into a 22-bed ICU (medical and surgical) in a metropolitan tertiary teaching hospital of 955 beds over a 6-month period (652 patients) | Reasons for discharge delay: unavailable beds (81%); patients’ condition severity; lack of single room for infection control purposes; lack of transport to other facility; lack of medical/nursing cover on ward; ward nurses’ skills; ward doctors chose less sick patients. | Single site. |

*ACCCN: Australian College of Critical Care Nurses

There are many factors that could influence discharge decision-making. Heidegger et al. (2005) conducted a study on discharge decision-making. They provided five clinical situations to ICU medical directors from 75% of Swiss ICUs. They found that the discharge practices and discharge decisions varied with different levels of resource availability in different hospitals. These research findings show that making a discharge decision can be a difficult task for the decision makers, because discharge guidelines are not available in many units (Pronovost, et al., 1999), and if they do exist, discharge decisions may vary because of the influence of non-clinical factors such as resource availability (Sprung, et al., 1999).

The role of ICU nurses in the patient discharge was found to be more process oriented. In an ethnographic study, Brand (2006) found that ICU nurses were not comfortable in contributing to the patient discharge decision-making process, as they perceived it as a medical responsibility. However, the critical care nurses were found to play a proactive role in bed management decision-making, especially when there was pressure on bed availability when discharging patients from HDU.

In a climate of improving resource efficiency and patient safety, discharge planning in ICU has been studied by various researchers in recent years. Research shows that many ICU nurses either do not think discharge planning happens in ICU (Watts, Pierson, & Gardner, 2005) or lack knowledge about discharge planning (Chaboyer, et al., 2002). Watts et al. (2005) found that 9% of critical care nurses claimed that lack of knowledge was one of the important factors impeding the discharge planning process in critical care, a finding supported by a later study (Chaboyer, et al., 2006). Research related to interventions designed to help ICU nurses better plan discharge were effective in changing ICU nurses' attitudes towards discharge planning in ICU (Chaboyer, et al., 2004).

Early discharge planning in ICU may help to improve resource utilisation by more smoothly discharging patients to the wards, and eventually home. Assessment of a patient's discharge needs in ICU will allow sufficient time to get problems sorted and equipment organised for the patient's timely discharge from hospital. However, as discussed in a dissertation by Bunn (2007), discharge planning in intensive care has various challenges. Patients often stay in ICU for a short period of time, and their condition can change suddenly leading to rapid improvement or deterioration. ICU nurses often need to focus on the care of the patients during the initial phase. Then the discharge decisions are often made as soon as the patients' conditions stablise. Furthermore, the demand for ICU beds can force the rapid discharge of some patients. This often gives ICU nurses little time to carry out discharge planning. Therefore education to improve ICU nurses' knowledge about discharge planning, and a systems strategy to ensure the implementation of discharge planning in ICU, are needed to improve the process.

Other studies found that the main reason that ICU patients could not be discharged was the ward staff's lack of knowledge and skills to look after the higher acuity patient (Bunn, 2007; Chaboyer, et al., 2004; Häggström, et al., 2009; Watts & Gardner, 2005; Whittaker & Ball, 2000). Häggström et al. (2009) found that without sufficient support and education, ward nurses stated that they felt less confident to care for the patients with complex needs. Chaboyer et al. (2005) found that an ICU liaison nurse helped ward nurses to feel more equipped with knowledge and skills, and more confident about accepting patients from ICU, which could optimise the discharge process.

There are limitations in the studies on individual factors' influence on ICU discharge process. The study conducted by Heidegger et al. (2005) and Watts et al. (2005), which are both surveys that involved participants from multiple centres, were surveys and did not investigate what happens with ICU discharge decision-making in clinical practice. Other studies were all single setting while some studies also had small samples (Brand, 2006; Chaboyer, Gillespie, et al., 2005; Whittaker & Ball, 2000; T. A. Williams & Leslie, 2004). Situational awareness of team members and its impact on patient safety has been gaining more attention in healthcare research in recent years (Flin, et al., 2008); however, its impact on ICU discharge process has rarely been studied.

## Teamwork Factors

Multidisciplinary teams are common in modern hospitals, with each team member having a specific role, and following the line of hierarchical authority and structure (Horwitz, 1970). The role of effective teamwork in accomplishing complex tasks has been well studied (Baker, et al., 2005). Salas et al. defined a team as "a distinguishable set of two or more people who interact, dynamically, interdependently and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform" (Salas, Dickinson, Converse, & Tannenbaum, 1992, p. 4). Teamwork commonly refers to the knowledge, attitudes and skills that enable the team members to coordinate and function to achieve their collective outcome (Flin, et al., 2008; Paris, Salas, & Cannon-Bowers, 2000). Empirical literature suggest that team processes such as leadership and team structure, communication and coordination are associated with healthcare team performance (Oandasan et al., 2006; Pronovost, et al., 1999; Salas & Cannon-Bowers, 2000; Vincent, et al., 1998).

Table 5 summarises the four publications related to teamwork in the ICU discharge process. In the following discussion, the literature is reviewed under the subheadings of communication and coordination, team leadership and structure, and team training. Because there is limited literature available about team structure and leadership factors and ICU patient discharge, under the heading of “team structure and leadership”, factors related to ICU processes in general are reviewed in the hope that the findings of these studies could be applied in the ICU patient discharge process which is part of ICU day-to-day work.

Table 4 Studies related to teamwork factors contributing to ICU patient discharge process

| Author (year) Country | Research Method and Instruments | Setting/Sample | Findings | Limitations |
|---|---|---|---|---|
| Bunn (2007)<br><br>New Zealand | Exploratory study<br>Focus groups | 9 ward nurses in three groups | Themes:<br>They forget what it's like: ICU nurses' lack of understanding of ward nurses' competence; lack of experienced nurses on the wards. | Single setting. |
| Crocker & Keller (2005)<br><br>UK | Prospective Action research.<br>Intervention: A new process led by HDU* nurses.<br>A discharge tool was developed and audited. | 10-bed HDU.<br>Multidisciplinary team working in the HDU. | 1. There were too many hand-offs, too many steps in the process, and few of them had any value to the patient's experience.<br>2. Perceived benefits after implementing a new nurse-led process: 1) Patient transfers became smoother and patients felt more prepared. 2) Communication was better and more efficient. | 1. Only action phase is reported in this paper.<br>2. Single site. |
| Häggström et al (2009)<br><br>Sweden | Grounded theory<br>Focus groups<br>Individual interviews regarding patient discharge from ICU to ward | 35 ICU nurses from 3 ICUs, five general wards in two Swedish hospitals | Main theme: struggling with a gap<br>1. Ward nurses felt frustrated and insecure when dealing with ICU nurses.<br>2. ICU nurses thought better communication could improve the teamwork with ward nurses regarding patient transfer time.<br>3. Better communication between ICU and the wards was important for the transfer happened more smoothly.<br>4. Tools to aid communication were identified as critical in the discharge process. Handover between ICU and ward nurses was perceived as problematic.<br>5. Support and education were perceived as important to empower ward nurses. Without these, ward nurses felt insecure to care for the patients with complex needs. | The study explored the perceptions of the participants only. |
| Whittaker & Ball (2000)<br><br>UK | Exploratory pilot study.<br>Questionnaires.<br>Semi-structured interviews. | Sample: Nurses (RN and enrolled) from two wards receiving adult ICU patients in a large teaching hospital.<br>Questionnaires were sent to nurses (response rate: 36%).<br>Seven nurses were interviewed. | 1. Most staff thought communication could be improved, especially the handover process. Phone handover should be brief.<br>2. Face-to-face handover should be most inclusive. | 1. Single setting.<br>2. Pilot study |

*HDU: High Dependency Unit

**Team structure and leadership**

Team structure and leadership influence teamwork performance (Flin, et al., 2008). In a literature review on healthcare inter-professional teamwork, Xyrichis and Lowton (2008) found that composition of the team (which professional groups in a team), team member status, and leadership were some of the main elements of team structure that affect teamwork performance.

Team member status is often determined by organisational position hierarchy. A hierarchical order in health care has been found to be associated with suboptimal teamwork performance (J. R. Smith & Cole, 2009; Thomas, Sexton, & Helmreich, 2003). Power distance refers to the belief that less powerful or lower-ranked members of institutions expect and accept power to be unequal, with members in higher positions having more power than them (Hofstede, 1991). Studies suggests that healthcare organisations are often hierarchical and the power distance between staff of higher status and those of lower status is often great, with senior doctors often having higher status and more power than all other staff (Brand, 2006; Islam & Zyphur, 2005; Reader, Flin, Mearns, & Cuthbertson, 2007). Position hierarchy could be a risk to patient safety when staff members in higher positions are given too much power in decision-making without considering other team members' opinion in the ICU patient discharge.

Doctors have traditionally dominated health care because of their expertise in patient care (Horwitz, 1970). Among the various professional groups in hospital settings, each group has its own cultures, status, language and education frameworks that influence its team members' expectations of teamwork and how they function within a team (Horwitz, 1970). Conflicting perceptions of teamwork between doctors and nurses have been well documented. Research evidence suggests that doctors often feel more positive about teamwork and communication between doctors and nurses, while nurses often take a submissive role in decision-making and feel uncomfortable speaking up when issues arise (Edmondson, 2003; Mills, Neily, & Dunn, 2008; Reader, et al., 2007; Thomas, et al., 2003). These communication issues could prevent staff members such as nurses from speaking up when issues with safe practice arise, which could pose a risk to patient safety, and lead to preventable errors.

Research shows that leadership is essential to create a safe and open atmosphere in clinical communication (Flin, et al., 2008; Leonard, et al., 2004), and that the quality of unit leadership was associated with the openness of team communication in ICUs (Reader, et al., 2007). The ICUs that encouraged open communication among team members and across teams were found to perform better in terms of patient LOS (Zimmerman et al., 1993). Limited research is available on leadership and its impact on ICU patient discharge. Additionally, while there has been increasing interest in individual factors and teamwork factors in healthcare research, few studies have explored the multidisciplinary teams' influence on the ICU patient discharge process.

**Communication and coordination**

Communication and coordination are considered important factors that could influence team performance (Flin, et al., 2008) and patient outcomes in hospitals (Manser, 2009). Communication problems were found to be a factor that may contribute to adverse events in intensive care (Pronovost, et al., 2002; Vincent, et al., 1998). A more recent study found that communication issues were associated with two-thirds of sentinel events in hospitals (Haig, Sutton, & Whittington, 2006).

Communication within teams, such as between doctors in one team, and across teams, such as between ICU and ward nurses, have been found to impact on ICU teamwork. Coordination among teams and departments is important for better patient care (Shortell et al., 1994).

Communication and coordination between teams from ICU and the wards have been found to be inadequate in ICUs. In a Greek study, less than 50% staff from other departments perceived coordination and communication with ICU staff as adequate (Kydona, Malamis, Giasnetsova, Tsiora, & Gritsi-Gerogianni, 2010). In a Swedish study, ICU and ward nurses from three Swedish ICUs perceived that the ICU patients could be discharged more smoothly when doctors and nurses worked collaboratively between ICU and the wards, and also with better communication (Häggström, et al., 2009). However, both of these studies only investigated staff members' perceptions and did not provide information on the level of communication and coordination between ICU and departments in real settings.

Similarly, a lack of communication between doctors and nurses exists (Alvarez & Coiera, 2006), and the frequency of communication among doctors and nurses has been identified as a factor in doctor-nurse teamwork (Nadzam, 2009; The Joint Commission, 2007) and a potential contributor to clinical errors (Donchin, et al., 1995). In a study examining causes of human errors in ICU, Donchin et al. (1995) suggested that inadequate communication and problems with communication between physicians and nurses could contribute to many dangerous human errors. They found that only 2% of the recorded ICU doctors' activities involved communicating with nurses, and alarmingly, this limited communication between the doctors and nurses was related to a large proportion (37%) of errors reported. However, there has been limited literature available on the level of communication in the discharge process between ICU doctors and nurses.

Clinical handover in hospitals has been the focus of healthcare research in recent years (Baron & Byrne, 2004; Chaboyer, Johnson, & Wallis, 2009; McFetridge, Gillespie, Goode, & Melby, 2007; Singh, Thomas, Petersen, & Studdert, 2007). Handover structure, the handover environment, the language the handover participants use, and tools used have be found to be associated with the quality of clinical handover (Chaboyer, Johnson, et al., 2009; Häggström, et al., 2009; McFetridge, et al., 2007; Solet, Norvell, Rutan, & Frankel, 2005). Häggström et al. (2009) reported that ICU and ward nurses perceived the handover process between them during ICU patient discharge process as problematic. ICU nurses often gave lengthy handovers with too much unnecessary information, while ward nurses did not receive enough useful information. These findings supported the results of a study from the UK which found that ward nurses often did not receive enough information, and this lack of information made junior ward nurses felt frustrated when receiving ICU patients (Whittaker & Ball, 2000). Handover processes also seemed problematic in ICU patient discharge. Crocker and Keller (2005) found that the existence of too many unnecessary steps in handing off patients in ICU/HDU patient discharge was perceived as a barrier to efficient discharge. Whittaker and Ball (Whittaker & Ball, 2000) found that ICU nurses gave too much unnecessary information to ward nurses during the phone handovers before patient transfer, and that face-to-face handover was too brief.

The studies discussed above (Bunn, 2007; Chaboyer, Gillespie, et al., 2005; Häggström, et al., 2009; Whittaker & Ball, 2000) investigated staff members' perceptions of the handover practice but did not offer insights into how ICU to ward nursing handovers were carried out in practice. Although handover is currently a priority of the patient safety agenda (World Health Organisation, 2007) and has been researched, to some extent, within the general hospital setting (Bomba & Prakash, 2005; Fassett, Hannan, Robertson, Bollipo, & Fassett, 2007; McFetridge, et al., 2007), limited research has investigated the association between handover and patient outcome in ICU discharge.

Communication tools have been found to influence clinical communication in intensive care. Miller, Scheinkestel and Joseph (2009) found that artefacts supported only 48% of conversations in an ICU, but only 1.2% of conversations were supported with computerised information. They concluded that care coordination was not optimally supported by the necessary tools. However, this study only recorded audible conversations that happened in an ICU. Visual cues may reveal tool use that occurs outside conversations. In the study conducted by Häggström et al. (2009), participants identified that tools that allow ward nurses to access patients' ICU notes prior to patients' transfer to the wards are critical in aiding communication and safer care. However, tool use in real time was not investigated in this study, and ward nurses stated that ICU nurses did not put sufficient information in discharge documentation (Bunn, 2007). However, precisely how tool use influences the ICU patient discharge process has rarely been studied.

Teamwork involves shared organisational goals and coordination of effort among team members and across teams. Team members must work in a coordinated manner to realise their shared goals. In large organisations, teams make fewer mistakes when each team member understands their own roles and responsibilities

(Salas & Cannon-Bowers, 2000; Sims, et al., 2004; Smith-Jentsch, et al., 1996). Using a daily goals form for ICU patient care, Pronovost (2003) found that when team members understood the goals better, ICU LOS decreased from 2.2 days to 1.1 days. These findings were supported by Jain et al. (2006) who found that a multidisciplinary team involvement in daily goal setting for ICU patient care, bed management, and best practice promotion reduced adverse events, and further reduced the cost and LOS. Similarly, Miller et al. (2009) found that failure to discuss the goal implementation process during the morning round contributed to care coordination breakdowns. However, the extent to which the daily goal sheets were included in discharge plans is unknown. Additionally, the association between patient outcome and improved collaboration and teamwork was often not measured (Lingard, Espin, Evans, & Hawryluck, 2004; Oandasan, et al., 2006).

**Team training**

Problems in team leadership and structure, communication, and coordination must be addressed to achieve better team performance and patient safety. A team cannot realise its shared goals if the team members do not have teamwork skills. Team training has been considered beneficial in improving teamwork (Salas et al., 2008). Baker et al. (2005) found that teamwork training improved the communication and collaboration in teams.

In a meta-analysis of 168 published team training research publications, Salas et al. (2008) found that team training was effective in improving team process and performance outcomes. Improved communication and collaboration among ICU doctors and nurses through team training were found to be associated with significantly decreased patient ICU mortality (Nap, Silva Alvaro, Fidler, & Reis

Miranda, 2000). In recent years, the association between non-technical skills and patient safety has been the focus of many healthcare research studies (Flin, et al., 2008; Nemeth, 2008; Reader, Flin, Lauche, & Cuthbertson, 2006). However, healthcare workers are rarely trained to work as teams in current education systems and empirical research on team training and ICU discharge teamwork is rare.

## Summary and Recommendation

Intensive care patient discharge is influenced by organisational factors, individual factors and teamwork factors. The current extent of the use of discharge guidelines decision-making and its association with patient outcomes are unclear. Improving ICU resource efficiency is imperative in the context of resource shortages and increasing demand for Australian intensive care services. Some organisational interventions are effective in reducing ICU discharge delay and shortening patient hospital stay. However, due to methodological issues and clinical practice variations in research settings, further research is needed to provide a better understanding of the role of organisational interventions, such as the use of ICU liaison nurses, in optimising the discharge process.

Individual factors, including discharge decision-making, staff knowledge, and skill mix can influence the ICU patient discharge process. However, current empirical evidence has its limitations. Some research studies have only investigated participants' perceptions, while other studies were mostly single setting, or with relatively small samples. A more in-depth study of the impact of individual factors on the ICU discharge process is needed.

Teamwork factors, including communication among team members, coordination among teams and departments, leadership and team structure, could all impact on team performance. Better communication and coordination among teams have been found to be associated with better patient outcomes. Leadership is crucial to encourage open communication within healthcare teams. The hierarchical structure of the healthcare team could negatively affect team communication. Research on teamwork and its influence on ICU discharge process is rare.

The prominent role of ICU services in hospitals requires healthcare researchers and administrators to examine all the ICU processes closely to ensure the best use of limited and expensive resources, and provide best quality of care to patients. In order to provide evidence for best clinical practice in critical care, more rigorous research is needed to discover how organisational factors, such as discharge guidelines and policies, individual factors, such as clinical decision-making, and teamwork factors, such as patient handover, influence the ICU patient discharge process.

There are some limitations in the review. It has deliberately excluded the well-researched area of patient factors that contribute to ICU patient discharge. These were excluded because of the complexity of this aspect, and the aim of this review was to focus on areas that maybe amenable to change but are not as frequently considered.

# CHAPTER THREE

# THEORETICAL UNDERPINNINGS OF THE STUDY

## Introduction

The aim of this exploratory study was to examine the current ICU discharge process, in order to identify vulnerable areas and practices that impede the discharge process and that need to be improved. Cognitive ethnography (Hutchins, 1995a) was used as the method to explore the ICU patient discharge process. The rationale for using cognitive ethnography and the methods of data collection is presented in Chapter Four. To guide methodological design, a theoretical framework that incorporated two complementary theories, distributed cognition and activity theory, was employed. This approach provided a methodologically sound and yet innovative structure to guide data collection and analysis. Activity theory was applied to describe the current discharge activity at the local or ward level because it is particularly suited for studying local activities. Distributed cognition was used to uncover how humans and artefacts interact, and how the discharge process was transformed at the organisational level because of its strengths in discovering how multiple players accomplish complex tasks in a distributed cognitive system.

Theoretical and empirical literature suggest that both activity theory and distributed cognition are suitable frameworks to study complex systems (Engestrom, 1987; Hutchins, 1995a); however, each of them has its strengths and limitations. This chapter explains these theories and the rationale for adopting both theories to study the discharge process. First, it explores how distributed cognition guided the research. Then activity theory and its application to the ICU patient discharge process are discussed. Finally, the ways in which these two theoretical underpinnings were used complementarily in this study are explained.

## Distributed Cognition

Distributed cognition was developed by Hutchings and his colleagues in the US in the mid to late 1980s (Hutchins, 1995a). It is grounded in anthropology (Decortis, Noirfalise, & Saudelli, 2000) with its current term, distributed cognition, introduced in the mid-1980s (Hutchins, Smelser, & Baltes, 2001). It is defined as a branch of the cognitive sciences that explores and analyses cognition in real-world settings (Hutchins, 1995b; Star, 1996). A cognitive work system is composed of a collection of individuals and the artefacts they interact with, together with their relations to each other in a large work environment (Hutchins, 1995b; Le Bot, 2004). Distributed cognition was initially used to explore interactions between people and technology (Hollan, Hutchins, & Kirsh, 2000). It proposes that cognitive properties are situated in system's activity processes rather than in the minds of the individuals (Hollan, et al., 2000). For this reason it is considered an ideal framework for exploring work systems in artefactual, social and cultural dimensions (Perry & John, 2003).

Cognition has traditionally been used to refer to an individual's mental functions, processes and states of knowledge that affect the control of behaviour (Benjafield, 1992). Mainstream cognitive science focuses on the internal computational processes and symbolic representations in individuals' minds (Susi, 2006). In contrast, distributed cognition focuses on cognitive processes in the functional activity system, such as a workplace, rather than in the minds of the individuals, and considers the functions of the system as the factors that determine system performance (Hutchins, 1995a). According to Hollan et al. (2000), distributed cognition distinguishes itself from other approaches to analyse complex organisational work in terms of three distinctive principles: cognitive processes are distributed among individuals in the group; individuals interact in a meaningful context; and individuals interact with artefacts.

First, distributed cognition examines the broader cognitive processes in the system rather than the traditional view of cognition which focuses on the individual level. In *Cognition in the wild*, Hutchins (1995a) described observing the work of the crew on a ship at sea. Hutchins (1995a) suggests that cognitive processes are distributed across the members of a social group in large cognitive work environments. Each individual possesses variable knowledge and expertise and no single individual could achieve the collective goal that the team could achieve together, in the large work system. Second, distributed cognition considers the variety of mechanisms that are assumed to participate in cognitive processes such as how individuals interact with each other. The individuals need to share their knowledge and expertise and coordinate their actions in order to achieve the common goal. Last and most important, distributed cognition scrutinises how humans interact with Cognitive artefacts, the tools that support cognitive processes in complex work systems (Hutchins, 1995a). Coordination of work in large distributed cognitive systems relies on effective cognitive artefacts to document, transfer and share information among members in various locations and at various stages of the cognitive processes (Hutchins, 1995b; Nemeth, Cook, O'Connor, & Klock, 2004). Problems identified while artefacts are being used in real-world settings, indicate the lack of effectiveness of the cognitive artefacts. Thus the cognitive artefacts evolve and develop over time and space while they are being used by different group members at various stages in the distributed cognitive system (Hutchins, 1995a, 1995b; Hutchins, et al., 2001), and they change according to organisational needs (Nemeth, et al., 2004). In a study exploring the work processes with an operating theatre, Nemeth et al. (2004) suggested that distributed cognition was an appropriated framework to study the complex environment of an operating theatre that consisted multiple rooms, various participants (surgeons from various specialties, nurses in various roles, and others).

As stated by Hutchins (2001), when applying the above principles to the observation of human activity, there are three characteristics of how cognitive processes are distributed in the cognitive activity system: 1) cognitive processes can be distributed among team members in a group; 2) the functions of the cognitive system requires the coordination of internal and external structures; and 3) cognitive processes are distributed through time where earlier events transform later events. Distributed cognitive systems are believed to have their vulnerabilities because cognition is distributed through teams, time, space, and artefacts (Patel & Cohen, 2008). Problems and gaps can occur in any stage. Each member's expertise and understanding of the tasks and collective goals can influence how well various tasks are completed and linked together; problems may arise during the interactions among members of the group; and the utilisation of the cognitive artefacts (tools) by members from different departments and/or at different times poses challenges to how the tools are used by various members and whether the information being shared via the tools is understood consistently.

Distributed cognition is an appropriate framework for analysing hospital clinical systems because such systems require each of the team members to understand the discharge process and take action accordingly, and to collaborate and coordinate their work by using appropriate artefacts such as medical records, computer programs, and telephones (Galliers, et al., 2007). Furthermore, team members' actions need to be supported by relevant artefacts and each team member's decisions and actions influence how other team members respond. In recent years, distributed cognition has been used by researchers to investigate various dimensions of coordinated work in a variety of hospital settings, such as cognitive processes in heart surgery (Hazlehurst, et al., 2007) and in the psychiatric emergency department (Cohen, et al., 2006; Hakimzada, Green, Sayan, Zhang, & Patel, 2007), team member communications in the operating rooms (Nemeth, et al., 2003), handovers in the emergency department (Laxmisan, et al., 2007), and the interactions between healthcare professionals and cognitive artefacts in critical care (Xiao, 2005). Distributed cognition is suitable when there are multiple actors in the cognitive process. It may not be appropriate to study simple work processes that involve lone practitioners, unless the process is part of a bigger process.

**Distributed cognition and ICU patient discharge process**

The ICU discharge process, which occurs in a complex hospital environment, shares similarities with the work processes in above study settings such as operating theatre and emergency rooms. Although distributed cognition has not been applied in ICU discharge research, its application in studying many other healthcare areas demonstrates that it may be a suitable theoretical framework to study distributed cognitive processes in the discharge process. Distributed cognition provides a suitable framework because the ICU patient discharge process involves many individuals who made decisions and take actions for their individual tasks, and the success of the discharge process relies on them working in a coordinated manner by using various artefacts.

First, the cognitive process is distributed among many team members and a number of discrete and overlapping teams, including staff from ICU, the wards and other hospital departments. Each team member carries out various tasks so that the team as a whole achieves the ultimate goal of transferring patients from ICU to the wards. No single team member could achieve the collective goal and each team member must use available information to make decisions and carry out their tasks. However, hospitals are typically dynamic systems. Patients' conditions change and organisational needs evolve; therefore the team members need to have a level of awareness of what is happening in the bigger discharge environment so they can modify their objectives and execute actions to fit into the dynamic discharge process. Current literature suggests that variances exist in team members' cognitive processes in the discharge process (Heidegger, et al., 2005). Pronovost et al. (2003) found that when team members understood daily goals better, patient ICU LOS reduced because team members' actions were aligned towards a common goal.

Second, the discharge process needs the coordination of multiple departments and teams in order to achieve safe and efficient patient transfer. The ICU is situated in a hospital system that contains multidisciplinary teams and departments which are highly interdependent with each other. Modern hospitals use this system to reduce waste and increase efficiency (Cook & Rasmussen, 2005). Therefore staff members from ICU, the wards that accepts patients from ICU, other hospital support services, and hospital management must coordinate their work to avoid waste (time and labour) and ensure patient safety. As suggested by Vicente (2004), effective coordinated teamwork and shared objective are essential to achieve the organisational goal.

Finally, staff members need to use cognitive artefacts to communicate vital information. Modern hospitals are large distributed cognitive systems that rely on cognitive artefacts to aid communication and coordination (Nemeth, O'Connor, Klock, & Cook, 2006). Discharge guidelines and policies, patient documentation, handover tools, and computer programs are some examples of the cognitive artefacts that could be used in the discharge process. Since cognitive artefacts evolve during their use by various people and at different places in the process, under the guidance of distributed cognition, the research may uncover how staff from different departments used the cognitive artefacts and how this interaction influences the discharge process.

This discussion has established that distributed cognition provides a framework for understanding the discharge process. It may help to identify problems in the way cognition is distributed and how team members work with one another. How staff members interact with cognitive artefacts may indicate whether the tools are effective and useful for all parties involved, and if improvements are needed. However, distributed cognition as a theory has its limitations. Distributed cognition is a theoretical approach that focuses on the cognitive processes in the complex cognitive system and may not be able to view and analyse discharge activity at local level. Because of its focus on cognitive processes and artefacts, it may not be able to reveal the non-cognitive artefacts that exist in a complex work system (Artman & Waern, 1999; Galliers, et al., 2007). In this thesis, a practical approach, activity theory, which could uncover the different level of activities within complex work systems, is used to complement distributed cognition.

## Activity Theory

Activity theory is a framework for studying and analysing human activity at the individual and social levels in the social development process by using human activity as the unit of analysis (Engestrom, Miettinen, & Punamaki, 2006). Within activity theory, an activity is defined as a basic part of human behavior that can be analysed within a meaningful context, and its purpose is to achieve the outcome for which the subject aimed. It is rooted in the Russian cultural-historical school of psychology, which emerged in the 1920s and 1940s (Engestrom, et al., 2006). It was first introduced to the international audience in 1978 by Leont'ev through the English translation of *Activity, Consciousness and Personality* (Leont'ev, 1978) and the publication of a collection of translated papers written by theorists working within the activity theory framework (Wertsch, 1981).

Leont'ev's first-generation version of activity theory provided a practical approach to ergonomic design in Russia (Vygotsky, 1978). The theory was further developed and expanded by Engestrom in Finland in the 1980s, where he initially applied it to human–computer interaction (HCI) research. It has evolved from the first generation to the third generation since its birth and is now being used in research from many countries around the world in many disciplines (Engestrom, 1987; Engestrom, et al., 2006). Activity theory has been used in western countries in the past decade to study cognitive work systems in a variety of settings, such as computer-supported learning in education (Barab, Schatz, & Scheckler, 2004; Zurita & Nussbaum, 2007), group work analysis in education (Choi & Kang, 2009), and studying and analysing medical practice (Engestrom, 2000). The following sections explore the three generations of activity theory, and then describe the conceptual aspects of activity theory and its relevance to the ICU patient discharge process.

**Development of activity theory**

Activity theory's philosophical roots lie with Karl Marx's work. Marx proposed that social change is the result of the transformations within everyday practice (Engestrom, et al., 2006). Led by Vygotsky (1978), the early development of cultural-historical activity theory was object-oriented action mediated by cultural tools and signs. That is, tools mediate subject and objects. With the help of artificial means, subjects determine their behaviours. Vygotsky claims that humans are creative beings and they determine their behavior through the object(s) they create. Vygotsky's contribution to activity theory here is the introduction of the idea *mediation* and *object-orientation*.  Figure 2 shows the first-generation of activity theory, which deals with tool-mediated, object-oriented actions.

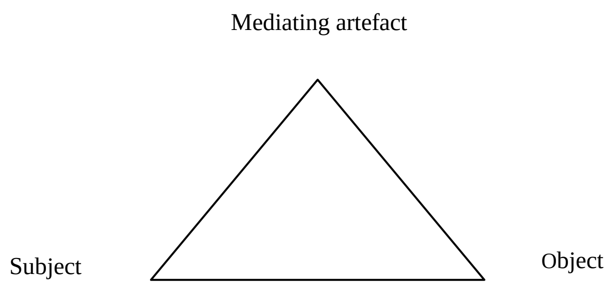



Figure 2 First-generation of activity theory (Vygotsky, 1978).

Leont'ev later (1981) formulated the concept of activity base on the model of human-object oriented activity from Marx's concept of labour. He emphasised two important aspects in labor activity process:

> The first is the use and making of tools. “Labour,” Engels said, “begins with the making of tools.” The second feature of the labour process is that it is performed in conditions of joint, collective activity, so that man functions in this process not only in a certain relationship with nature but also to other people, members of a given society. Only through a relation with other people does man relate to nature itself, which means that labour appears from the very beginning as a process mediated by tools (in the broad sense) and at the same time mediated socially. (Leont'ev, 1981, p. 208)

Within the activity theory framework, activity resides within a context that includes factors such as rules and guidelines, community values and beliefs, and the skills and abilities of other people and groups. Contextual factors determine why activity occurs, and how in broad terms and with what configurations of skills it occurs. Within this context, specific goal- or object(ive)-driven activities are undertaken by people. The interaction between people and their objectives are mediated by tools including language and other cultural signs (Vygotsky, 1978). These factors jointly determine the nature of activity; however, their influences vary widely. For example, organising ward beds for the ICU patients can be quite different from hospital to hospital in Australia. For hospitals that use computer programs to communicate bed demands, the request could be as simple as ticking a box on a computer screen. However, for hospitals that do not use electronic programs to manage hospital beds, hospital staff may have to use phone calls and paging systems to communicate with each other about bed availability information.

Within activity theory, human actors are not passive. They modify tools and their behaviours in response to changing objectives and influences. For instance, current research evidence showed that after-hours ICU discharge was associated with increased mortality (Beck, et al., 2002; Duke, et al., 2004; Priestap & Martin, 2006). Because research evidence influences clinical practice in healthcare settings, ICU clinicians may modify their discharge protocols to ensure that after-hours discharges are avoided, or create measures to ensure patient safety if after-hours discharges have to occur. Tools come to embody aspects of the culture and the aspirations of the people who created and use them. Once created, tools can also enable activity that may not have been considered by the original creators of the tool. Many new tools or methods may not have been possible without precedent tools from other disciplines. For example, building shared situational awareness to promote better patient outcomes and effective resource use in healthcare settings was the result of lessons learned from aviation (Nemeth, 2008). The original creator of situational awareness training in aviation may not anticipate the significant influence their methods had on healthcare and patient safety today.

The second-generation of activity theory was developed based on the first generation. In the late 1970s, Engestrom (1987) published the milestone work *Learning by expanding*, in which he consolidated and elaborated the theory's essential components and represented these in a triangular form (see Figure 3). This model consists of six aspects of human activity: subject, object, tools, rules, division of labour, and community. Although the names of each of these aspects vary as a consequence of translational differences – for example, object is referred as objective, tools as instruments at different times – the meaning of each aspect remains consistent. This model shows that tools mediate subject and the objective, rules determine how subjects function in the community, and division of labour influences how the community achieves the collective objective.

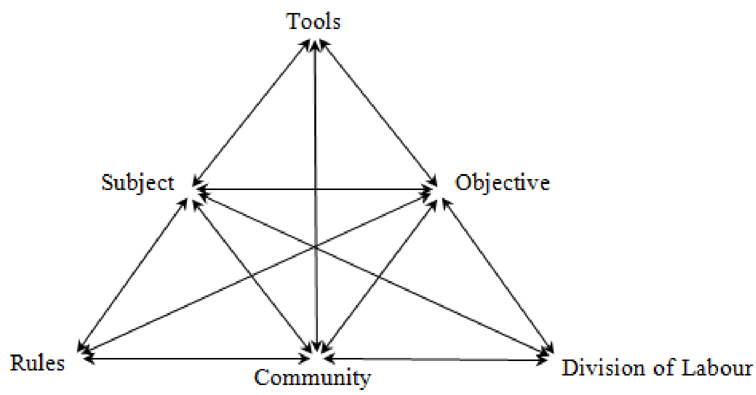



Figure 3 Second-generation activity theory (Engestrom, 1987)

The single triangular human activity model was challenged when activity theory was debated in countries outside Russia. It was not sufficient to explain the multiple perspectives and interactions in a large context. Thus the third-generation of activity theory was developed, which consists of two interconnecting triangular systems (Figure 4). In this iteration activity theory can be used to explore and understand the interactions and network dialogues among interacting activity systems. Ideally, these systems are connected by the shared objective. Because artefacts mediate how humans achieve the objectives, the networking of interacting systems tests the functionality for the collective objective, and therefore artefacts are improved to accommodate the shared objective (Engestrom, et al., 2006). According to Engestrom (2000), systemic contradictions that occur during the constant movement of activity systems offer the potential for process development and transformation. As a result, this generation of activity theory is attracting increasing interest from researchers focusing organisational change. The interactive activities and processes are coordinated by the shared objective.

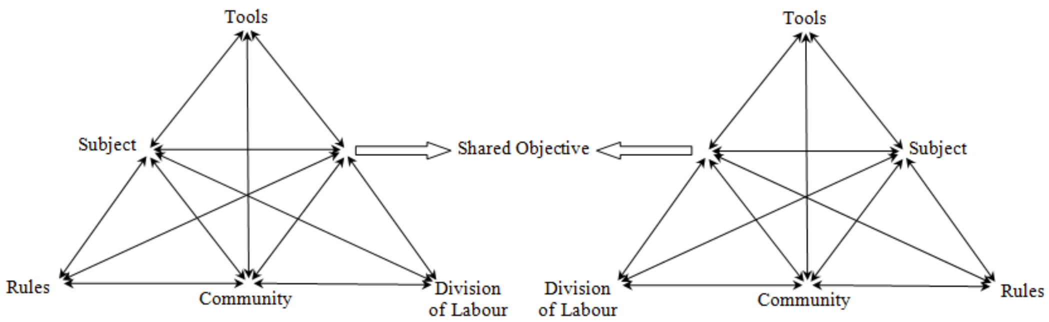



Figure 4 Third-generation of activity theory – the interacting activity systems adapted from Engestrom (2000)

Implicit in activity theory is the distinction between individual and collective activity. Leont'ev (Vygotsky, 1978) proposed a social hierarchy of activity with three levels: *activity, action, and operation*. The upmost level *activity* is object-related, motive-driven collective *activity*. Goal-driven individual *action* is the middle level. And the conditions and tools of action-driven automatic *operations* are the bottom level (Leont'ev, 1978). The importance of the hierarchy of activity was thought to be the identification of the drivers of collective activity in practice by doing hierarchical activity analysis at these three levels (Bardram, 2000). Thus, in this research, identifying the drivers of the discharge activity and their influence in the discharge activity is essential in order to make recommendations for practice improvement.

Activity theory's fundamental unit of analysis is the human activity. As suggested by Engestrom (1987), to construct the human activity system, the researcher must have both the system's view and the subject's view of the system. The subject's view can be obtained by selecting some subjects from the activity system. The human activity system can be constructed according to these subjects' views and interpretations. At the same time, the system's view can be achieved by looking at the human activity at a higher level and seeing how each human activity system interacts with each another. These two views are important for this research because they complement each other and as a result, the researcher not only sees how the human activity system functions locally, but also how it is situated in the broader context. In this research, gaining the system's and subject's view of the discharge process not only provides insight into how each of the ward-level activities was carried out, but also uncovers how the various discharge activity systems, such as ICU and ward discharge activities, interacted. By doing this, gaps and issues in the discharge process may be identified.

**Application of activity theory to the ICU patient discharge**

As discussed by Susi and Ziemke (2001), activity theory has been considered as a descriptive tool that aims to understand the activity. There has been increasing interest in using activity theory as the broad approach in designing new multidisciplinary cognitive systems (Engestrom, 2000; Nardi, Whittaker, & Schwarz, 2002; Quek & Alderson, 2002). In social science, activity theory contributed greatly to the emerging multidisciplinary wave of interest in cultural practices and practice-bound cognition (Engestrom, et al., 2006). Activity theory brings a new perspective when designing conceptual tools and searching for methodological and theoretical answers in social sciences by providing a structured way to understand the activities in context, and therefore to identify the problems that need to be addressed in the complex system (Quek & Alderson, 2002). It is also able to provide a clearer structure for human cognitive systems research because of the clearly named six aspects of the activity system (Halverson, 2001) when compared with other theories that study complex cognitive processes. According to activity theory, historically formed mediating artefacts and cultural resources in the large society inform local activity. Conversely, the interactions among systems inform the movement of the artefacts (Engestrom, et al., 2006). The ICU patient discharge process is a complex cognitive process which involves multiple professions and departments, which may include ICU discharge activity, ward admitting ICU patient activity, hospital bed management activity, and other related activities. The following paragraphs explain the components of activity theory including the subject, the tools (or the instruments), the object (or objective), the rules, the community and the division of labour, and their relevant meaning in the ICU patient discharge process study applying the principles of activity theory (Engestrom, 1987; Leont'ev, 1978; Vygotsky, 1978).

### *Subject*

The *subject* can be one person or a group of people who share the same objective in the process. A subject can be involved in many activities, each with a different objective, forming many different activity models. Each activity model only shows one activity and one objective at a time. In the ICU patient discharge process, subjects could be identified at group level and individual level.

Third-generation activity theory emphasises the interactions of multi-activity systems in context. Each of the six components of an activity system is a product of other systems that produced them, including subject producing systems, tool producing systems, and organisational systems that determine *division of labour*. The subject producing system, that is, how the health professionals are trained, influences the way the subjects carried out the discharge activity. Subject producing systems interact with the subject’s activity system (Jonassen & Ronrer-Murphy, 1999; Quek & Alderson, 2002). Thus subject producing systems need to be explored to identify issues and gaps in the healthcare professionals' training process in relation to ICU discharge.

### *Objective*

The term *objective* is preferred here to *object* because in activity theory, the translated term *object* refers to what the subject's activity is *directed towards* (Engestrom, 2000). Therefore *objective* seems to be a more appropriate term to avoid confusion. Other researchers have also used the term *objective* instead of *object* in the application of the activity theory in their research (Quek & Alderson, 2002). This research needs to explore and reveal each professional group's objectives in the discharge process. Ideally, the objectives of various subjects involved in this process should overlap or be shared to some degree in order to achieve the best collective outcome.

### *Tools*

The *tools* are the artefacts that are used by the *subjects* to carry out the activity toward an *objective*. They can be physical *tools* such as a pen and paper, computer software, telephones; they can also be cognitive properties, such as language, knowledge, and ways of communicating. A key concept in activity theory is the artefacts' mediating function. By using *tools*, the subject carries out an activity to achieve an *objective*, thereby turning the *objective* into an *outcome*. Therefore it is said that the subject and objective are mediated by the *tools*. A range of *tools* may be used in the ICU patient discharge process. For example, the progress notes, discharge summaries, the phone calls, the formal clinical handovers and informal conversations that occur all mediate a successful patient discharge.

The quality of the *tools* and the extent to which they mediate or frustrate the discharge process may have a significant effect on outcomes. This is especially the case for *tools* when they cannot be easily modified or adapted by individuals or groups to suit immediate needs. For example, the information needed in a discharge summary may not be immediately apparent resulting in vague, ambiguous, and incorrect information being included. In a paper-based form, the labels, instructions or layout of the form can be modified with very little effort. This is not the case for computerised information presentations that may require a more formal change process. The consequences of poor *tool* mediation include patients being discharged at the wrong time, into a wrong room, or mistreatment. Thus this research needs to identify the *tools* that were used by various subjects in various activity systems and how they mediate the *subjects* and *objectives*.

***Rules***

*Rules* refer to the explicit or implicit routines, policies, guidelines and rituals that determine and govern the activity within the community. The relationship between the subject and the community is constrained and enabled by its rules. Rules and policies also determine what is and is not acceptable behaviour. In this research, from the organisational perspective, rules may refer to the guidelines, policies and protocols used in the hospital, the written or unwritten discharge criteria, the routines, and beliefs that people use to guide the discharge decision-making process. Rules may also include behaviours and rituals that have not been formalized but which are none the less expected, assumed and sanctioned when violated, for example, some of the informal rules on ward bed allocation. Therefore this research needs to identify what the rules were and whether they facilitate or impede the discharge process.

### *Division of labour*

D*ivision of labour* refers to how the tasks and work are divided among members of the community. Clarification of roles and responsibilities and how well and efficiently the community achieves the objective are mediated by *division of labour*. It is a very important aspect in the ICU patient discharge process because how clearly team members understand their role and responsibilities, and how well tasks are divided, determine the efficiency of the workflow, and help to avoid conflicts.

Role clarification among members from various departments may affect the outcome of the ICU patient discharge process. According to activity theory, when people understand what their role is their actions fit into the overall activity well. Inefficiencies occur when people are unclear about their roles and those of others or how the process is intended to unfold. When there is any problem in the process, conflicts occur. For example, if a team member does not know who is supposed to carry out a particular task, this may leave a gap in the process which may cause discharge delay. Thus data collection and analysis needs to explore roles and responsibilities of each subject (professional group) in the discharge process, and to identify gaps and problems that influence how the whole community achieves the desired outcome.

### *Community*

Within activity theory, *community* includes all subjects who espouse similar values, beliefs and rituals in an activity. The subjects do not just co-exist within the community; they are mediated by the *rules*. Community is influenced by the broader culture of which it is a part and evolves through cooperation and interaction between its members and with other communities. The ICU discharge process takes place within a hospital community which includes all departments and levels of management. Within the hospital community there might be many sub-communities. Each department within the hospital could be seen as a sub-community in which several different professional groups such as doctors, nurses and other professionals work. Alignment between the sub-communities affects the efficiency with which they interact and may also affect the quality of patient outcomes. Ideally, each professional group needs to adjust their beliefs and values to meet the expectations of all the communities to which they belong. Furthermore, *division of labour* mediates *community* and *objective*. Conflicts, gaps, or overlaps in *division of labour* among various subjects often arise, which may impact on how the community as a whole realises the collective objective.

There could also be expanded community members from a broader perspective. For example, on the professional perspective, Australian and New Zealand Intensive Care Society (ANZICS) and Australian College of Critical Care Nurses (ACCCN) were part of the larger community that governs the rules and regulations by setting up accreditation and competency standards for the *subjects* in the discharge process activity system.

The aim of this research is to explore the discharge process in order to provide recommendations for practice improvement in this hospital. Thus data collection needs to explore who forms the discharge community, and how *tools, rules* and *division of labour* mediate *subjects, community, and objectives*. The factors related to the broader community such as the professional organisations that have an impact on the discharge process in this hospital may also need to be explored. Figure 5 summarises what this research aimed to explore in relation to the six components of Activity Theory.

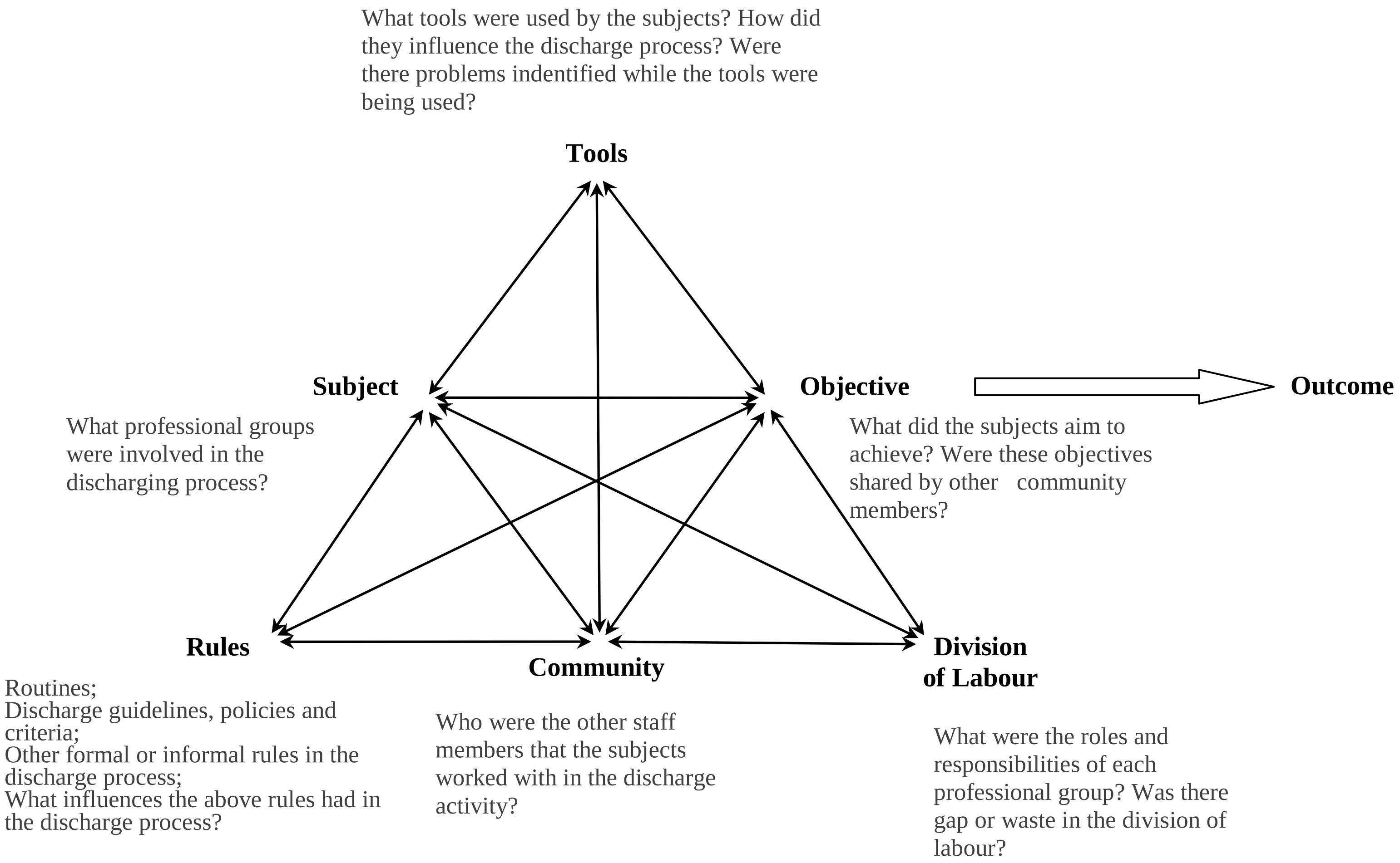



Figure 5 Application of activity theory to the ICU patient discharge process

### Limitations of activity theory

Although Activity Theory may provide a clear conceptual framework to analyse local activity, it has its limitations. First, it cannot explain macro-level perspectives and processes because of its focus on local activity (Daniels, 2004; D. Martin & Peim, 2009). For example, issues with *division of labour* within a large organisation such as in a hospital cannot be resolved at a local level such as in an ICU. Second, activity theory only considers the social transformations that occur at a specific activity or cluster. It suggests that an activity system may develop and transform by redesigning its tools and adjust its objectives during its interactions within a broader context (Engestrom, 1987). However, it does not see the transformations at a higher level. Finally, while activity theory considers how tools mediate  subject and objective, it does not clarify how the use of tools by the subjects of one local activity influence the functions of other activities and its impact on the collective outcome (Artman & Waern, 1999). These limitations must be considered when applying activity theory to organisational research because it may limit the observations during data collection and the interpretations in data analysis.

## Using Activity Theory and Distributed Cognition to Explore the Discharge Process

Distributed cognition and activity theory are closely tied together because they share a common interest: cognition in complex work systems. While they have been mostly used as standalone theoretical frameworks for understanding cognitive work settings (Barab, et al., 2004; Cohen, et al., 2006; Hazlehurst, et al., 2007; Laxmisan, et al., 2007; Nemeth, et al., 2003; Zurita & Nussbaum, 2007), there have been some studies that used the two together to study complex work systems (Galliers, et al., 2007; Jones & Nemeth, 2005). The use of the two theories in the discharge study may be an innovative approach because both theories have strengths and limitations in cognitive systems research (Decortis, et al., 2000), which is the reason the two theories may complement each other in this research.

First, the two theories study social transformation at different levels, which may provide a deeper understanding of how the discharge process transforms than using either theory alone. Hung, Tan, and Koh (2006) argued that in an activity system, social transformations take place on two distinctive levels: in context and in process. They suggested that context transformation refers to the macro-level developmental nature of the community, which evolves over time and place, while process transformation refers to the developing nature of actions and cognition at the micro level. Therefore, as suggested by Halverson (2001), activity theory can provide a clearer conceptual framework for categorising and analysing how local-level activity systems develop and transform (process transformation) while distributed cognition offers flexibility in understanding how the bigger social cognitive structure evolves and transforms (context transformation).

Jones and Nemeth (2005) used activity theory as an approach to study the distributed cognitive work system. In a study aimed at comparing activity theory and distributed cognition as theoretical frameworks in the setting of a transport company, Decortis et al. (2000) concluded that activity theory focused on the local activity that uncovered the developmental process of the activities in complex systems and examined the contradictions within the activity triangle of the subjects. In contrast, distributed cognition revealed “how information was represented and transformed, its trajectory and how representations (internal and external) are coordinated in the system. It considers the work setting as a thinking system performing cognitive tasks" (Decortis, et al., 2000, p.28). Thus, by using both theories, this research may be able to reveal how the discharge activity evolved on both the organisational level (context) and the local level (process).

Second, to complement distributed cognition's lack of clear structure in data organisation (Galliers, et al., 2007), activity theory could be used as a conceptual tool to facilitate the data collection and data analysis because of its well-constructed six components. The use of both theories is needed because the discharge process is situated in a large complex hospital system, which has many mini-processes embedded in it. Activity theory captures the details of the discharge activity at group and departmental level to understand how each group or department functions including the way they follow organisational rules, how they work with other staff within the hospital, and how they fulfill their roles and responsibilities. However, the researcher must have an open mind when collecting and analysing data and not be restricted by the six components of activity theory. It is possible that there are things that do not clearly fall into any of the six components, which may test the suitability of the theory in the discharge study.

Third, the role of artefacts differs between activity theory and distributed cognition. Activity theory reveals all artefacts (tools) used in the discharge process, while distributed cognition focuses on the cognitive artefacts and their role in transforming the discharge process (Artman & Waern, 1999). In activity theory, a tool may be scrutinised in relation to its mediating functionality (how the subjects achieve their objectives), but the theory does not consider how the tool use influences the broader discharge context. In contrast, in distributed cognition, studying the interactions between individuals and cognitive artefacts may reveal how tool use transforms discharge process. For example, tracking how a particular cognitive artefact was used and understood by various participants at different times and departments might reveal how the artefact influences process efficiency and safety in the discharge process. Because activity theory focuses on local activity, using this theory alone might not be able to identify the problems that result from tool use in various departments by various people. Similarly, because distributed cognition does not have a focus on non-cognitive artefacts, using this approach alone may not be able to identify important non-cognitive artefacts that may have a significant influence on the discharge process.

Finally, since distributed cognition and activity theory share a common interest in cognition, the application of both theories could also serve to triangulate data, so the researcher can make sense of the collected data and the discharge process through the lenses of two different theories (Hammersley & Atkinson, 2007). By viewing the distributed cognitive process from different angles, the findings on teamwork, communication, the use of artefact may be compared, contrasted, and strengthened.

## Summary

In summary, distributed cognition offers a wider and system's approach to guide this study. It may be used as a theoretical framework  to understand the activity in the processes of change and development in cognitive systems (Engestrom, et al., 2006; Halverson, 2001). Hospital environments are large distributed cognitive systems whose functions are influenced by humans, the artefacts that humans work with, and the ways humans interact. Activity theory is a powerful descriptive tool that provides a structured way to understand the coordinated cognitive human activity in complex work systems. Activity theory provides a practical approach to analyse and redesign complex cognitive work systems (Engestrom, 2000). In essence, the two theories may complement each other and help the researcher to see how the discharge process transforms in context and in process. Using distributed cognition and activity theory as the theoretical frameworks together may reveal findings that would not otherwise be uncovered by using either one of these theories alone.

# CHAPTER FOUR

# METHODS

## Introduction

The aim of this research was to understand the ICU discharge process in order to identify the factors that impede the discharge process and efficiency. Activity theory and distributed cognition were used as theoretical frameworks to guide the study. Cognitive ethnography was the methodological approach employed in this study to explore the ICU patient discharge process by applying ethnographic data collection techniques, including direct observations, semi-structured interviews, and document analysis. This chapter starts with a discussion of the rationale for using cognitive ethnography as a research method. This is followed by a description of the data collection process, including site selection, sampling, participant recruitment, researcher as instrument, and fieldwork. Finally, the data analysis process, research rigour, and ethical considerations are explained.

The first person is used in describing the field work and wherever else is appropriate in this thesis. It is agreeable that writing in first person on matters that the researcher has had personal involvement is an appropriated method for qualitative research. The use of first person, and the acceptance of the researcher herself/himself as an integral part of the research, does not mean the research lacks rigour (Webb, 1992). Sandelowski (1986) suggests that qualitative research values subjectivity. The subjective engagement of investigators with their research subjects is important to uncover truth from their life experiences.  Using first person in reporting this research, where appropriate, indicates my influence on the methodology employed, and data collected and analysed.

## Cognitive Ethnography as Research Method

Cognitive ethnography was developed from, but has some differences from, traditional ethnography (Hutchins, 1995a; R. F. Williams, 2006). This section first discusses the concepts of ethnography, leading to a discussion of cognitive ethnography, its differences from traditional ethnography, and the rationale of adopting cognitive ethnography in this research.

The concept of ethnography is rooted in cultural anthropology. It is considered a style of research that aims to understand the social meanings and activities in a given cultural setting (Brewer, 2000; Fetterman, 1998) and is often used as a method to describe why people do what they do (Roper & Shapira, 2000). It is generally agreed that ethnography uses a set of research techniques that commonly include participant observation, direct interviews, and examining documents (Atkinson, Coffey, Delamont, Lofland, & Logland, 2001; Hammersley & Atkinson, 2007). To understand a culture as a whole, the ethnographer needs to take a holistic approach to study the people, their beliefs, knowledge, and activities. Through participant observation, the researcher gains the insider's view of why people do what they do. At the same time, the researcher brings the outsider's view to the study (Roper & Shapira, 2000). By spending some considerable length of time in the field, the ethnographer gains an understanding of the patterns and characteristics of a community within a particular culture.

Cognitive ethnography is a method to study cognitive processes in real-world settings (R. F. Williams, 2006). Hutchins's *Cognition in the wild* (Hutchins, 1995a) was considered a seminal study using cognitive ethnography guided by the theoretical framework, distributed cognition. While traditional ethnography aimed to describe a culture and specifically the knowledge of the culture, cognitive ethnography describes how knowledge is constructed and used by members of a group and how humans carry out day-to-day cognitive activities (Hutchins, 1995a; R. F. Williams, 2006). By using ethnographic data collection techniques, such as fieldwork including interviews, participant observation, and examining artefacts, cognitive ethnography examines the cognition and communication patterns of coordinated activities within multidisciplinary organisations (Engestrom & Middleton, 1996; R. F. Williams, 2006).

Cognitive ethnography focuses on the process of activity development and its relation to social, cultural, and organisational processes. In simple terms, cognitive ethnography uses ethnographic methodology to study cognitive work systems (Hollan, et al., 2000). The methodological focus of the distributed cognitive process is on events that happen in the process (Hollan, et al., 2000). In *Cognition in the wild*, Hutchins used cognitive ethnography to describe how the crew worked together in navigating a ship. He suggested that cognitive systems, like navigating a ship, exist in many parts of human lives (Hutchins, 1995a). The ICU patient discharge process shares many similarities with work systems such as navigating a ship. They are both complex work systems that require the coordination of multiple team players by using tools to aid communication in the process. Therefore the research method (cognitive ethnography) used by Hutchins may be a novel way of investigating the ICU discharge process.

It has been argued that while there is no doubt that traditional ethnography will enable organisational researchers to gain a comprehensive understanding of their studied field, the characteristics of traditional ethnography such as intensity may create challenges for some organisational research (L. J. Ball & Ormerod, 2000; R. F. Williams, 2006). For example, the intensity of data collection in traditional ethnography may not be possible due to the time and financial constrains in organisational research. Traditional ethnography emphasises that the researcher needs to be immersed in the environment for a long time to gain a thorough understanding of the group culture (Fetterman, 1998). However, organisational researchers are often goal orientated, in search of answers to change and improve practice in a time-constrained context. The time and cost involved using a traditional ethnography can be difficult for organisational researchers.

Cognitive ethnography may be a more suitable method to study the discharge process than traditional ethnography because it differs from traditional ethnography in a few fundamental ways. First, the data collection focus of cognitive ethnography is on special episodes of activity and only these episodes will be observed and analysed; therefore the time required can be much shorter than in traditional ethnography, which observes everything that happens in the cultural group (L. J. Ball & Ormerod, 2000; R. F. Williams, 2006). Second, cognitive ethnography allows the organisational researcher to have an aim to find out something that can be changed and improved and focus on this aim, while traditional ethnography requires the researcher to have an open mind in data collection (L. J. Ball & Ormerod, 2000). Third, cognitive ethnography studies how artefacts influence human activity while traditional ethnography identifies the resources that form part of the group members' worlds. Finally, the focus of cognitive ethnography is the cognitive processes and how the processes are transformed in the distributed cognitive system while traditional ethnography uncovers the knowledge and meanings that defines a cultural group (Hutchins, 1995a; R. F. Williams, 2006).

Cognitive ethnography has been used by researchers to study different dimensions of cognitive healthcare systems, such as communication processes in critical care units (Malhotra, Jordan, Shortliffe, & Patel, 2007) and emergency department (Laxmisan, et al., 2007), and documentation in a psychiatric emergency department (Cohen, et al., 2006) and ICU (Hazlehurst, McMullen, Gorman, & Sittig, 2003). The ICU patient discharge process is a distributed cognitive process that involves a collection of humans and artefacts. Under the guidance of cognitive ethnography, participant observation, informal interviews and examination of existing artefacts were the main techniques employed in the data collection in this research. This research aimed to collect appropriate information to describe not only how members of the team interacted with each other, but also about how team members interacted with the environment and artefacts, and what things meant to the team members in the ICU patient discharge process. Cognitive ethnography is a suitable method to study the discharge process, because it studies how the cognitive discharge processes unfold in real-world settings.

In summary, cognitive ethnography explores how cognitive processes unfold in the real world. While traditional ethnography offers the researcher knowledge and insight into the culture of the studied group, cognitive ethnography examines knowledge, processes and activities in relation to social-cultural aspects and helps the researcher understand how the knowledge is structured and used in the cognitive processes. Thus cognitive ethnography is a suitable method to study the ICU discharge process.

## Data Collection Processes

Ethnographic data collection techniques including observations, interviews, and the examination of artefacts were used in this research. This section describes the data collection processes, including site selection, sampling, participant recruitment, and researcher as instrument.

### Site selection

This research was carried out in a 580-bed Australian tertiary public teaching hospital that covers a geographical population of 507,439 (2006 statistics). This hospital is affiliated with two tertiary universities. It is a major tertiary referral centre for most medical and surgery specialties, such as thoracic surgery, neurosurgery, general surgery, and surgical and medical oncology. The 14-bed level-3 ICU in this hospital is part of the hospital Division of Critical Care Services and academically aligned with the Department of Anaesthesia and Intensive Care. There are approximately 1500 intensive care admissions a year with an average patient LOS of 3.2 days. The typical case-mix is about equally split between medical and surgical patients. Historically, trauma load has accounted for about 20% of admissions. This ICU does not provide cardiac surgery, or paediatric and neonatal services. Burns patients are usually stablised and then transferred to other hospitals.

There appears to have been a resource shortage in this hospital at the time of data collection. The ICU bed occupancy rate was 97.9% in this hospital in 2006 (Foster & Richards, 2006). A total of 322 episodes of delayed discharge from the

ICU, accounting for 5,641 hours, occurred in 2006. Among these, 61 patients experienced more than 12 hours of discharge delay. Thus the need to improve the efficiency in use of available beds in this unit is paramount. The ICU and hospital management were keen to collaborate with the research team to improve the efficiency and optimise service delivery. Two of the senior staff members of the ICU joined the extended research team. This study formed Phase One of a larger study, *Enhancing Intensive Care Unit Discharges through Multidisciplinary Approaches*. Phase Two and Three of the larger study focused on implementing and evaluating an improved ICU patient discharge process.

**Sampling**

The larger research aimed at making clinical practice improvement, and therefore in Phase One, the ICU and ward activities and processes related to ICU patient discharge were observed. Patients' clinical conditions were not observed as this study was not about examining the decisions to discharge individual patients, but on how the discharge process was enacted. The observation focused on the things that happen during the discharge process such as interactions among staff, decision-making, documentation, identification of gaps, and breakdowns, in order to make improvements.

A "case" was used in the data collection process to manage the related data so that relationships among collected data were easily visible. It did not have the meaning of "case" as in "case studies" (Yin, 2003). Rather, the various data collected surrounding each patient discharge became a case. Discharge activities and processes on data collection days were observed, both in ICU and on the wards. The people involved in the discharge cases became participants. Within each case, there could be multiple participants, including ICU doctors and nurses, ward doctor and nurses, and other hospital staff such as hospital Bed Managers. A discharge process was considered complete if the case was observed from the morning when preliminary discharge decisions were made, to when 1) the patient was discharged to the ward, or 2) the patient was eventually discharged home because there were no ward beds, or 3) the patient died in ICU while waiting for a palliative care bed.

The purpose of data collection was to describe the usual patterns of the discharge process, so weekdays from Monday to Friday were chosen as the main observation days. Observations were conducted over two to three days a week. However, studying atypical patterns was also considered important and therefore data were also collected on a small number of weekends and public holidays. The data collected on weekends and public holidays were used to compare with the data from weekdays.

Although the longer the researcher spends in the field, the richer and more complete the data might be, in organisational research, often with financial and time constraints, field work ceases when there is a belief that the collected data accurately describe the patterns of the setting and show significant characteristics about the study field (Fetterman, 1998). The total number of observations was ultimately dictated by the richness of the data collected in the field. In this research, preliminary data analysis revealed that the richness of the data appeared almost sufficient after 10 days of field work over a four-week period. A total 28 discharges were observed in these 10 days. However, further preliminary data analysis indicated that more interviews with participants from different disciplines were needed. Therefore additional data were collected for seven days over a three-week period. Final data analysis suggested that the data collected during these two periods were sufficient to provide rich and thick descriptions of the discharge process.

### Participant recruitment

Hospital staff members involved in the ICU discharge process were recruited in ICU and on the wards. I first attended a Nursing Unit Managers' monthly meeting to advertise the project across the hospital because the ICU patient discharge process can involve many departments of the hospital, in particular, the various receiving wards. A flyer (Appendix 2) stating the project title, aim, the research team, and staff recruitment process was distributed at this meeting. The Nursing Unit Managers were asked to display the flyers in noticeable areas in their wards. I walked through the hospital one week after the meeting to check if the flyers were displayed throughout the hospital before participant recruitment information sessions.

All ICU staff member including doctors, nurses, and ward clerks were invited to participate in the study prior to the data collection. I endeavored to gain consent from as many ICU staff as possible before the field work began. Observations often started in ICU each morning at about 6:30am before the actual discharge decisions were made. Therefore all ICU staff who were working on the observation day could be observed at the starting point of each day's field work, regardless of whether they were involved in a particular patient's discharge or not. The consent of as many ICU participants as possible before data collection ensured that I could commence observations on getting into the field each day instead of spending time recruiting participants.

Information sessions were scheduled on different days over a two-week period to cover as many ICU staff as possible. Meeting rooms were booked in the hospital for the convenience of the participants. A meeting with the ICU doctors was held in conjunction with their monthly journal club meetings when most of the ICU doctors were usually present. An information sheet (Appendix 3), a consent form (Appendix 4), and an anonymous participant demographic data sheet (Appendix 5) were given to all staff who came to the information sessions. The staff members who decided to participate were asked to sign the consent forms at the end of these information sessions. They were also given the option to return the consent forms later. The ICU staff members who could not come to any of the information sessions provided consent individually during field work. Participants who were involved in looking after the patients to be discharged, along with the staff that did not look after those patients but had involvement in the discharge process, were observed and interviewed. On each of the observation days, I always arrived the ICU before the morning shift started, in order to identify the staff members who were on duty but had not consented to participate. They would be invited to participate and sign the consent forms before the observations started.

A one-on-one information session was conducted with the ward participants prior to their signing the consent forms. Ward nurses, doctors and any other staff members involved in admitting the ICU patients provided consent just before the interviews and observations. Once an ICU patient was allocated a ward bed, I would visit the destination ward to recruit the receiving nurse and doctor to participate in the study. Some of the hospital Bed Managers consented to participate in the study through the same process.

If any staff members who did not wish to participate on the first invitation, they were approached a second time at a later date in case they changed their minds. However, if the discharge case involved a staff member who did not wish to participate after the second approach, the discharge process was not observed. Consent forms were separated from the demographic data sheet as soon as they were collected. Each participant was given a code number for future analytic purposes and these codes were written on each demographic data sheet. A code book with staff members' names and code numbers was scanned and archived on my computer. The patients involved were asked to assent to their discharge process being observed. It was explained that only the nurses were being observed. However, the patients and/or their relatives were given the choice to say that they did not want the researcher to be present when their nurses were performing procedures. All patients agreed for me to observe the discharge processes.

Patient involvement in the discharge process was not observed. In Australia, ICU consultants generally have a gate-keeping role and will only keep patients in ICU if they are likely to benefit from ICU care. However, information such as average number of patients discharged to the ward, discharge delays, and number of patients received in a particular ward from ICU in a given period was extracted from the hospital patient information database to provide a clear understanding of the discharge process. This was approved by the university's and hospital's ethics committees.

**The researcher as the instrument**

I, as the researcher of this project, was the observer who carried out all participant observations, informal interviews, and collection/examination of existing artefacts. I have been an ICU nurse for many years and am very familiar with the ICU environment. As this research was an exploratory study, I had the advantage of having a general understanding of how the system worked, which helped me to capture valuable moments of the discharge process. However, this could also be a disadvantage as my experience in ICU meant it was possible that I might interfere with the discharge process by participating, or by letting my personal biases influencing the data collection and interpretation.

A risk in this kind of qualitative field work is that I could be insensitive to the content of the interviews and miss the opportunity to explore elements in the interviews because I might presume I understood the meaning that certain stories/comments contained. I was very much aware of this and took steps to prevent this from happening. I had regular meetings with my supervisors to discuss the issues I encountered. The regular meetings helped me to: 1) identify if any of my experiences interfered with data collection; 2) improve interview/observations skills; and 3) identify any biases during data collection. I also listened to the audiotapes as soon as they were made to find out if anything was missed during the interview process so additional interviews could be organised to explore the missing answers. However, on occasions where a patient safety issue arose, I spoke up. If interference by the researcher was identified after the data collection, the case was discussed with the supervisors and it was excluded.

## Field Work

Field work is an essential part of ethnography (Fetterman, 1998). The combination of data collection techniques used in cognitive ethnography, including participant observation, formal and informal interviews, and examining existing documents, is often described as field work. Exploratory field work is considered the characteristic feature of any ethnographic research (Atkinson, et al., 2001; Fetterman, 1998). The discharge processes including teamwork, communication, ICU patient discharge guidelines, policies, routines, role clarity, and use of artefacts, were investigated through direct observations, informal interviews, and collecting existing documents. This section describes the field work, including gaining access, entering and exiting the field, observations, interviews, field notes and contact summaries. During the field work, I constantly self-reviewed and conducted meetings with my supervisors to revise the strategies for further data collection. Each completely observed case informed future data collection.

**Gaining access, entering and exiting the field**

This project was approved by the hospital as well as by the Griffith University Ethics committees (Griffith University ethics number NRS/05/07/HREC, Gold Coast Health Services District ethics number 200694). I was introduced to the ICU Nursing Unit Manager (NUM) by the chief investigator of the larger study who had undertaken prior collaborative research with the ICU team. The ICU NUM introduced me to other ICU staff. An introduction by a member of the organisation being researched is important for the researcher to be accepted as part of the community (Fetterman, 1998). A "visiting researcher" name badge was issued to me for a period of six months. I had prior contacts with some of the medical and nursing staff and was familiar with this hospital for work purposes.

In ethnography, *field* means the place (in this case, an organisation) where the people being studied work. A series of dates was set with the ICU NUM for the researcher to enter the field and collect data. The ICU NUM was the first point of contact. I asked the ICU NUM to introduce me to the Nurses in Charge on the data collection days and to be the contact person if I required assistance. The ICU Nursing Educator offered to orientate me to the staff and environment in the ICU. My personal contact with some of the staff members in the past (as colleagues in another ICU) made entering the field much easier.

In ethnography, data collection and data analysis often happen simultaneously. The researcher often has to take some time away from the field to analyse the data and return to collect more data later. An exit strategy needs to be carefully planned to ensure a smooth return when indicated (Brewer, 2000). Exiting from the field can mean the researcher's physical exit from the field and emotional disengagement from the established relationships with the participants (Berg, 1998). Preparing the participants for disengagement is important because the sudden departure of the ethnographer can cause them hurtful feelings of deception. Proper exit can maintain the trust the researcher established during the field work. Good rapport and trust between the researcher and the participants are very important to the success of ethnographic research (Fetterman, 1998) and maintaining this relationship will leave open doors for the researcher herself or others for future research.

An exit strategy was carefully planned for the above reasons. After the first period of observations when my supervisors and I decided it was time to leave the field to analyse the collected data, I informed the participants that I was going to leave the field over conversations in the ICU and around the wards. I expressed the possibility of a future return if I needed to come back for more observation. Preliminary research findings were fed back to the participants informally to prepare them for my departure. On the final departure, I gave the participants an estimated date for the interim report of the research findings.

## Observations

ICU patient discharges were observed from the morning, when decisions to discharge patients to the ward were made. The nursing handover from night duty to day shift normally started at 7:00 am. The night duty medical officers usually handed over to daytime medical staff at 8:00 am. This was when preliminary discharge decisions were made. I started the morning observation at 6:30 am each day and left the unit in the afternoon or evening when the last planned discharge was finished. If there was still no bed available for a planned discharge patient by 6:00 pm, I would leave the field then.

Field notes documenting discharge activates were taken throughout the day in a chronological order. A Field Note Plan Sheet (Appendix 6) was designed as guide. The field notes were for recording the discharge activities that were not related to any particular discharge cases but might have significance in the whole patient discharge process, for example, the hospital bed allocation activities. They also contained reflective comments I made during observation. These were also highlighted to differentiate my personal comments from the observation notes. All field notes were later typed into word documents and double-checked before stored. All field notes were named by the dates that they were taken in order to make the link between organisational events and the ICU patient discharge process.

During the observation I followed the ICU medical and nursing team in the morning from nursing morning handover, medical handover, to the ward rounds. I would allocate a case number to a patient if a preliminary decision was made to discharge the patient to ward. I would then notify the ICU nurse caring for the patients to be discharged that they would be observed. I would decide how many cases to follow for a particular day to keep the observation load manageable. I observed one to two discharges on most of the days. But on a small number of days I observed up to four cases, when some discharges involved the same ICU staff (for example, one ICU nurse looked after two patients and they were both to be discharged). Observing too many cases simultaneously could be a difficult task and might compromise the quality of the data. During the ward round, particular attention was paid to the interactions among all nursing and medical staff such as who said what, and who responded to the question, and the way they interacted about patient discharge. The handovers between the ICU and ward nurses and doctors were also observed. The ICU nursing handovers to ward were audio-taped and later transcribed.

Hospital bed allocation and ward activities related to admitting the ICU patients were observed. Since some of the Bed Managers consented to participate in the study, I had numerous conversations with the Bed Managers when I met them in ICU or on the wards to gather information about the hospital beds situation and allocation for the day. I shadowed a Bed Manager for one day to observe the process of allocating beds to patients across departments. Shadowing, which is considered a useful technique in ethnographic field work (McDonalds, 2005), involves following a subject for a period of time to collect in-depth data and answer research questions. To explore the factors related to admitting ICU patients on the wards, I spent a day in a ward that received a high proportion of the ICU patients, observing their routines.

A specially designed case note (Appendix 7) was completed for each discharge process. The case note was part of the field note but it documents a particular discharge process. The case notes, like field notes, were taken in a chronological format stating the time of each event/interaction, the people involved, the result of the conversations, the phone calls made and the responses, and the time that took for a particular action to be carried out. The case notes were typed into Word documents by a research assistant and double-checked. Case notes were grouped together with their related data for the same discharge case.

The first week of field work was treated as pilot period. At the end of the first week, I met with my supervisors and discussed the emerging findings and issues that arose from the first week's data collection and analysis. Interview questions and strategies were revised to ensure the completeness of the data. Data collection tools such as field notes and case notes templates were modified.

**Informal interviews**

To gain insight into what people think they do in an organisation, interviewing is an important method in ethnography (Atkinson, et al., 2001; Fetterman, 1998). Interviews can be formally structured, semi-structured, or informal. Informal interviews are the most commonly used interview method in ethnography. They use a "casual" approach in the "most natural situations" to discover what people think and how their perceptions compare with those of others through conversations (Fetterman, 1998). The ICU patient discharge process involved multidisciplinary teams. In order to explore what and how each team member contributes to the process, the casual approach of informal interviews was considered appropriate because participant may feel more at ease in answering questions, instead of feeling being studied all the time.

Interviewing protocols and strategies were followed in the process. Respecting the culture of the group and observing its norms are thought crucial to the success of gaining cooperation from participants (Fetterman, 1998). One-on-one interviews can be difficult if the trust between the researcher and the participants has not been established (Fetterman, 1998). Therefore before the observation commenced, I spent a few days in ICU observing people and talking to people socially, joining the participants for morning tea, casually talking about why I was there and what I was going to do, and sharing personal/professional knowledge so that trust and confidence were established. I also undertook some casual visits to the wards to meet the ward NUMs and their staff for the same purpose. I had been colleagues with some of the medical and nursing staff members of this unit in the past, and my professional experience gave me an advantage in gaining the trust and cooperation of the staff members.

Short individual informal interviews of 10-15 minutes each were conducted with the consenting ICU participants, including ICU doctors, nurses and ward clerks, at a time that was convenient for them. The interviews with bedside ICU nurses most often occurred after a patient was discharged to the ward, while interviews with ICU doctors and Nurses in Charge usually happened at a time that was suitable for them. Each interview was audio-taped and marked with the case number, participant number and the date and time of the interview. The interviews were grouped together for each discharge case. Some staff members who were involved in the discharge decision-making process but did not look after the patients were also interviewed. During the interviews, both open-ended questions and close-ended questions were asked. Open-ended questions allowed the participant to interpret the question and offered the flexibility of what and how much they want to answer (Brewer, 2000). The participants were asked to recall the process of their patient's discharge and state any problems they experienced during this process, together with their views on the discharge decision-making, handover, and the contributions they thought they made in the process. How the documentations for discharge were used was also clarified with them. They were asked to describe the patient discharge process by drawing a diagram during the interview, from the time a decision was made to when the patient was discharged to ward. Closed-ended questions were also be asked to quantify patterns and behaviors (Fetterman, 1998), such as “How long did you have to wait for the wardsmen to come and help you with the patient?”. All consenting Nurses in Charge on the data collection days were interviewed. ICU consultants were interviewed if they were the in charge consultant for the day. All registrars, residents and interns who were working on data collection days gave consent, and some of them were interviewed.

To verify the accuracy of the information, I visited the receiving ward when ICU was notified by the Bed Manager that there was a bed available. The ward NUM or Nurse in Charge was then interviewed. Questions included the following: “Who makes the decisions to receive the patients?”; “If there is going to be beds available, what do you plan to do before you receive the patients?”; “What difficulties do you have in order to receive the patient?” Ward nurses who consented were often interviewed after the patients arrived on the wards. I asked questions about when they became aware that they were going to receive a patient from ICU; what preparations they had to do to admit the patient; what problems they experienced; what handover they received; and what contributions they thought they made in the process.

At the end of each day, the interviews not related to particular cases were grouped together in one computer folder labeled “interviews not related to cases”. The interviews related to cases were grouped by cases and each case folder was named “Case X” with X as the case number. All interviews were transcribed into

Word documents by an experienced research assistant. I double-checked these before they were filed for later data analysis.

### Collecting and examining artefacts

Ball and Ormerod (2000) suggest that the examination of artefacts facilitates data triangulation, which is essential in cognitive ethnography. When a discharge tool or form was identified during observation and interviews, how the participants used the tools or forms was observed, and blank and de-identified used forms were collected, analysed and put on file. If preliminary analysis revealed any issues with the tools, it was further explored in later observations and interviews.

At the end of the field work, statistical data was obtained from the hospital's database. The data required included the occupancy rate of the ICU and all wards, occupancy rate in the whole hospital, ICU patient discharge delays, and total number of ICU discharges on different weekdays for the data collection period. The hospital has a variety of databases that covers the data on a ward level, and also on a hospital level. These data facilitated the data analysis in identifying the problems in the ICU patient discharge process. Access to the database had been approved by the hospital's ethics committee.

### Contact summaries

Contact summaries (Miles & Huberman, 1994) were used to summarise the main points of the field work every day and to capture my momentary reflections and observations. I audio-taped my first impression of the main ideas, concepts, issues, notes and personal reflections after the each day's field work. Because ethnography involves large volumes of data, a timely contact summary prevents important information from getting lost (Fetterman, 1998). This contact summary was not about a particular case. It was a summary of my interpretation of what happened during the day. The information could be related to multiple cases or the ICU patient discharge processes in general. I also audio-taped a summary for each discharge case against the case notes, which I called the case summary. The case summary was similar to the contact summary but the content only related to a particular case. The taped case summaries and interview files related to cases were named and grouped by case numbers. The contact summaries for each day and case summaries for each tracked discharge served as a preliminary data analysis tool and allowed me to use the events and activities that happened during the day to inform the way data were collected in the subsequent days and cases. The contact summaries were used in data triangulation for the discharge process in general, while case summaries were analysed in relation to each discharge process.

One distinctive feature of ethnographic research data analysis is that data collection and data analysis happen simultaneously, which means that data analysis was ongoing during the process of data collection (Fetterman, 1998; Hammersley & Atkinson, 2007). The following section describes the process of data analysis.

## Data Analysis

Ongoing data analysis during data collection informed the completeness of the data collected. Each day's data analysis would inform the next day's data collection. Overall, the data analysis consisted of two phases: Phase 1: the coding and pattern-seeking process to describe the discharge process including the preliminary data analysis, analysing while managing and collecting data, and the coding and pattern-seeking process; and 2) Phase 2: generation of themes. This section describes the data analysis process in the following order: preliminary data analysis during data collection; demographic data analysis; coding for descriptive labels and sorting for patterns within activity theory components; and lastly, generalising, and finding themes under the guidance of distributed cognition.

**Preliminary data analysis during data collection**

Preliminary data analysis consisted of analysing data during the pilot period, managing the data on a daily basis, and making contact summaries and case summaries while collecting data in the field. Preliminary analysis guided by activity theory's six components (*subject, objective, tools, rules, community, and division of labour*) was carried out, which informed later data collection, such as which artefacts were collected in later data collection stages.

Sorting the collected data and taking daily contact summaries and case summaries provided an excellent opportunity for me to reflect on what data had been collected and what revision needed to be made for future data collection. The data managing process served three purposes. First, it gave me the opportunity to reflect on what had been collected and to identify gap areas that needed to be addressed in later data collections. Second, it prevented loss and misplacement of data. And last, it provided an indication of when the data was enough to draw a pattern from.

**Coding for descriptive labels and sorting for patterns – the description of ICU patient discharge process**

Coding is considered analysis (Miles & Huberman, 1994). Codes are tags or labels for assigning units of meaning to the descriptive information compiled during a study. There are different levels of codes enabling different levels of data analysis

(Miles & Huberman, 1994). This research applied the “mid-range accounting scheme” recommended by Bogdan and Biklen (1992), who divided the codes in categories such as setting/context, definition of the situation, perspectives, ways of thinking about people and objects, process, activities, events, strategies, relationships and social structure, and methods. In this study, the six components of activity theory acted as a mid-range accounting scheme by grouping the codes under each of the components: *subjects, objectives, community, tools, rules, and division of labour*. Initial sub-codes were added under each component according to the preliminary data analysis. For example, under the code *subject*, there were sub-codes of *ICU doctors, ICU nurses*, etc. A data-coding book describing the descriptive labels was developed during the data analysis while collecting data. Further codes were discovered and added to the initial framework while more data were analysed. A code named “outliers” and sub-codes were created to tag the findings that did not seem to fit into any of these six components

All original transcribed data including interviews, contact summaries, case summaries, and field notes were copied into NVIVO 8 to assist in data management. The six components of activity theory were used as “tree nodes” in NVIVO. Under each tree node, sub-nodes were developed according to the preliminary code book. Coding revision, as a progressive data analysis process, is an important process to ensure the coding system is appropriate (Bogdan & Biklen, 1992; Miles & Huberman, 1994). The first phase of the data analysis, the coding and pattern-seeking process, consisted of three steps: the first step was the initial reading and coding; the second step was the systematic revision of coding; and the last step was synthesising for patterns (Aronson, 1994).

The first step involved reading the contents line by line and coding all the data. During this process, conceptual literature was reexamined many times for methodological clarification. A vast coding system was developed during this stage. The second step was the first systematic revision, which involved going through the coded data again, examining each of the activity theory components, seeking patterns, and going back to the methodological literature. Revisions occurred constantly while reading and coding the data. During this phase, the coding system was revised and evolved. Some initial codes were removed, or merged into other codes, or changed names to fit the context, while new codes were added when the data analysis became clearer. The computer software NVIVO 8 was used to manage the first and second step coding.

The next step of coding enabled me to put chunks of data into meaningful units, and provided the primary foundation for the next step of data analysis, pattern-seeking. Patterns refer to recurring regularities in qualitative data (Miles & Huberman, 1994). Through sorting, categorising, comparing, and contrasting in groups and categories, the patterns emerged. The process of sorting for patterns may bring the birth of more patterns than the researcher anticipated. As a result, it deepens the researcher's understanding of the study's field (Fetterman, 1998). The coding process enabled me to identify patterns in the various discharge activities under the activity theory framework.

After the second step was completed, all the codes were printed out on paper. Quotes with similar meanings were grouped together and examples of quotes were selected for each code. Synthesised tables for each activity theory component were developed in Word documents. The purpose of this step was to shrink down the number of quotes under each code for easier presentation and further data analysis. Coding revision continued during this third step. During the synthesising process, it was found that some codes from second-step coding was either too small to show a pattern or too closely related to others and difficult to distinguish from each other. These codes were merged into one bigger code. For example, under the "Tools" component, there were two codes regarding the doctors' discharge paperwork for ICU: "Medical Discharge Summary", and "Other Medical Paperwork for Discharge". The data in both codes showed similar patterns in the way the paperwork was done, who did the paperwork, and how well participants used them. These two codes were merged into one code: "Medical Discharge Paperwork". At the same time, some codes were moved from one of the activity theory components to another. There were some sub-codes that did not seem belong to any of these components. For example, "Transit Lounge" was kept as "outliers" during the first and second step of the first phase of data analysis because it was not clear where it belonged. It became clearer during the third step of coding that "the transit lounge" activities were missing from the *division of labour* component. Therefore this code was moved under *division of labour*. At the end of the third step, all "outliner" codes were moved under relevant activity theory components.

By reading the quotes across the sub-codes and analysing related quotes within each activity theory component, the patterns of the discharge process emerged with examples of quotes for each pattern. Descriptive labels for each pattern were revised a few times, following discussions with my supervisors. The result of the pattern-seeking process was the detailed description of the ICU patient discharge process reported in Chapter Five. The results from this phase of data analysis provided the foundation for the second phase of data analysis, generalising themes.

### Generalising for themes

According to Denzin and Lincoln, themes are “abstract constructs that investigators identify before, during, and after data collection” (Denzin & Lincoln, 2003, p. 275). Themes emerge by grouping the related patterns together to form a comprehensive view of the studied field and reflect the participants’ collective experience (Aronson, 1994).

The first phase of data analysis provided a detailed description of the discharge process, which informed this second phase of data analysis to construct themes. The aim of this step was to move beyond the local discharge activity, and uncover the relationships among the patterns within each local-level discharge activity, and how the discharge activity was transformed in the distributed cognitive system. The synthesised table of the three local discharge activities, and the vast coding system, categorised under the discharge activities in ICU, on the wards, and in hospital bed management, were reviewed many times. Theoretical literature was revisited at the same time to make sense of the data. Themes were constructed in relation to the three dimensions of distributed cognition: how the cognitive process was distributed across members of the group, how team members interacted with each other in a meaningful way, and how the participants interacted with cognitive artefacts (Hutchins, 1995a). The similar patterns from each of the local discharge activities were grouped together under the distributed cognition framework, which resulted in the final themes.

The process of interweaving literature and the data is important to help the generation of themes (Aronson, 1994). The process of grouping patterns from each of the discharge activities systems, to finalising themes were repeated many times and each time the themes became clearer. A total of five themes related to each of the dimensions of distributed cognition emerged. Within each theme, there were various dimensions. The themes are described in Chapter Six.

**Data triangulation**

Data triangulation methods, often considered a routine feature of ethnography, were introduced to enhance the quality of ethnographic research (Brewer, 2000; Fetterman, 1998). It has been suggested that data triangulation can be achieved through four different ways: method triangulation, sources triangulation, theoretical triangulation, and investigator triangulation (Denzin, 1989; Taylor, 2006). Method triangulation involves the use of multiple data collection methods such as observations, interviews and collection of documents to validate a particular finding. Data source triangulation involves comparing data collected from different phases of field work, different points in the temporal cycles occurring in the setting, or the accounts from different participants on the same finding (Hammersley & Atkinson, 2007). Responses from different participants on the same issue were often used to triangulate the data. Checking one participant’s accounts and verifying this by interviewing others can be very time consuming, but this provides the validity check as well as the depth of meaning of collected data (Hammersley & Atkinson, 2007). Using multiple theoretical framework to cross check and compare the data collected can achieve theoretical triangulation (Fetterman, 1998; Roper & Shapira, 2000). Investigator triangulation can be achieved by using many individuals to collect and analyse a single set of data (Taylor, 2006).

This research uses method triangulation, source triangulation and theoretical triangulation. First, method triangulation was used by a combination of ethnographic data collection methods such as participant observation, informal interviews, and the examination of existing documents. Second, source triangulation by checking and comparing data collected from different sources was used to verify some findings. For example, a nurse stated that "I don't think I made any contribution to the discharge decision-making process". This statement was compared with the doctors' statements about nurses' contributions in the patient discharge decision-making process. As a result of the triangulation, a more accurate understanding of the contribution of nurses to this decision making process was achieved. Finally, the use of the two theoretical frameworks, activity theory and distributed cognition, to view the cognitive discharge process from different angles may be considered as theoretical triangulation.

## Research Rigour

Research rigour in naturalistic inquiry is critical to ensure the study's trustworthiness (Guba & Lincoln, 1994). It has been suggested that credibility, fittingness, auditability, and conformability are essential aspects to evaluate the rigour of a qualitative study (Lincoln & Guba, 1985; Sandelowski, 1986).

The issue of credibility refers to the truth value of a qualitative research, which means the extent to which the lived experience can be recognised by the participants and readers of the research (Sandelowski, 1986; Taylor, 2006). Persistent observation, member checks, and triangulation are important techniques to increase the credibility of ethnographic research (Lincoln & Guba, 1985; Sandelowski, 1986). Persistent observation offers depth to the ethnographer's understanding of the field (Guba & Lincoln, 1994).

A typical day of my field work in the ICU normally started before 7:00 am when the night shift to morning shift nursing handover was about to take place, and continued until the last case of discharge was finished, with the latest time of my departure from the hospital at 7:00 pm. This ensured the completeness of the data collected. By following the patient and nurses to the destination ward, understanding of the whole patient discharge process was achieved. This intensive observation plan ensured the data collected reflected the real process and avoided a superficial understanding of this process. I carried out 17 days of field work over a four-month period. Member checks, which involved verifying statements made by one participant or participants with other participants, provide assurance that the findings reflect the truth. Triangulation is considered crucial to improve the credibility of ethnographic research (Fetterman, 1998; Guba & Lincoln, 1994; Roper & Shapira, 2000). In this research, three data triangulation methods were used to ensure the credibility of the findings.

The concept of fittingness (Lincoln and Guba use the term *transferability*) refers to the generalisability of research findings into other contexts outside the research setting (Lincoln & Guba, 1985; Sandelowski, 1986). Sandelowski (1986) argue that although the sample sizes are often small in naturalistic inquiry, a thick description of the setting and participants may be representative of the researched group. This research selected the samples based on the research objective, and emergent findings during data collection informed further sample selection. The persistent field work ensured there was a thick description of the discharge process. Although the discharge processes in this research setting may not represent all discharge processes in other ICUs, the findings of this research may be relevant to the ICU discharge processes in other hospitals that have similar characteristics, for example, in terms of the hospital size, level of ICU, patient characteristics, and resource availability.

Auditability (Lincoln and Guba use the term *dependability*) refers to the decision trail of the qualitative research which can be laid open for external scrutiny (Lincoln & Guba, 1985; Sandelowski, 1986; Taylor, 2006). A qualitative study and its findings are considered auditable when another researcher can follow the investigator's decision trail (Sandelowski, 1986). Methods to ensure auditability include a clear documentation of data collection, methods and decisions in the study process. The contact summaries and case summaries reflected my personal understandings of events and also documented the rationale for further exploration of significant events. Regular meetings with two experienced supervisors were held to discuss the data analysis progress. The discussions and decisions made during these meetings were documented. A paper trail of data analysis documented the process of data analysis. Stages such as coding, sorting and the reasons for re-entering the field were documented.

Once credibility, fittingness, and auditability are established, confirmability is achieved (Guba & Lincoln, 1994; Lincoln & Guba, 1985; Sandelowski, 1986). The persistent observations, data triangulation, thick description of the discharge process, and the clear documentation of the decision trail in data collection and data analysis ensured the credibility, fittingness and auditability of the study. Therefore confirmability was achieved in this study.

## Ethical Considerations

In ethnographic research, ethnographers often spend considerable amounts of time talking to people about what they do, what they think of, and how they work with people. The data collected can be very sensitive and confidential. The questions asked during interviews can be difficult and intrusive for the participants. This research project was approved by both Griffith University's and the hospital's ethics committees (Griffith University ethics number NRS/05/07/HREC; Gold Coast Health Services District ethics number 200694). In line with the guidelines published by the National Health and Medical Research Council (2007), this study was planned to incorporate the principles of respect for participants' rights and autonomy, beneficence and justice.

Participants' rights and autonomy were maintained by the following safeguards: 1) strict consenting process; 2) giving participants the choice to decide to participate or withdraw at any time; and 3) seeking participants' permission for informal interviews. Participants were given the choice of when and where they would like to be interviewed. The consent process strictly followed the plans stated in the ethics applications. Because most of the ICU staff gave consent prior the commencement of data collection, I reconfirmed with the participants if they wished to continue to participate in this study in case any participants had changed their mind. The two senior staff member of the ICU, who were part of the research team for the bigger project which this study was the first phase, had a potentially unequal relationship with some study participants because they were line managers to the participants of the unit. This risk was minimised because they were not involved in the participant recruitment, consent and data collection process. Consent was not obtained from patients as they were not part of the observed group. However, they were given the chance to choose whether they would like the researcher not to be present while their nurses were carrying out clinical procedures for them.

Participants were assured about the confidentiality of the content of conversations and observations. Participant consent forms were separated from the demographic information sheet as soon as possible, and each participant was given a code number to protect their identity. Data storage methods strictly followed the ethics approval. The interviews often took place at quiet locations that were away from busy work areas to ensure the confidentiality of the participants. Every effort was made in the write-up of the research report to ensure that the identities of the participants were not disclosed. For example, when some participants may be identifiable within the context of the interviews, the names of the participants were changed to maintain their confidentiality. The names of the wards to which patients were discharged were also given an alphabetical label for the same reason.

The research findings of this study could potentially benefit the studied group. This research aimed to explore and describe the ICU patient discharge process. The findings may provide evidence and recommendations for future quality improvement projects for the hospital, which may lead to improved service delivery, better patient outcomes, better teamwork and staff satisfaction.

Justice was maintained by treating all participants equally. The selection of participants was carefully considered to ensure data collected were representative of all staff classifications. At the same time, all participants were given equal opportunity to participate in the study. The culture of the studied hospital community was diligently observed and respected through the research project.

## Summary

The aim of this study was to explore the ICU patient discharge process to gain an understanding of the various processes embedded in the discharge process, and how the multidisciplinary work and the use of artefacts influence the discharge process. Cognitive ethnography was considered an appropriate method for this research because it enabled the researcher to study the patient discharge process with a clear aim in a time-effective manner by using data triangulation. Field work and the data analysis process followed ethnographic study principles. Preliminary data analysis during data collection and thematic content analysis at the completion of data collection were undertaken. The first phase of data analysis under the guidance of activity theory resulted in a detailed description of the discharge process. Themes emerged under the guidance of the distributed cognition framework. Data triangulation technique was used to enhance the research rigour. The research was approved by the university and hospital ethical committees, and ethical consideration was given to participants according to the ethics applications.

# CHAPTER FIVE

# THE ICU PATIENT DISCHARGE PROCESS

## Introduction

This study aimed to identify issues and practices that impede the ICU patient discharge process. The findings may provide the foundation for future clinical practice improvement at the local level (ward level) and the organisational level (hospital level). The earlier chapters explained the theoretical framework and method used in this research. This chapter firstly gives a description of the participants and the research setting. This is followed by a description of the findings from the first phase of data analysis, describing the ICU patient discharge process using activity theory as a framework. From the observations, interviews, and examination of relevant documents and artefacts, large amounts of data were collected. The data analysis involved a pattern-seeking process, which allowed the researcher to group similar information into meaningful units in order to provide a detailed description of the ICU discharge process. This description underpins the next phase of data analysis, formulation of final themes, which is presented in Chapter Six.

## The Participants and the Setting

The participants consisted of the following: 1) ICU and ward medical staff including Consultants, Senior and Junior Registrars, Residents, and Interns; 2) the ICU and ward nursing staff including Level I Registered Nurses (RN), Level II, and Level IV RNs; 3) hospital Bed Managers; and 4) Ward Clerks. Details of the participants are given in Table 5.

Table 5 Participants' position classification and interview status

| Classification | Consented | Percentage of total consented | Interviewed |
|---|---|---|---|
| ICU RN Level I | 41 | 48.2 | 12 |
| ICU RN Level II | 10 | 11.8 | 5 |
| ICU RN Level IV | 1 | 1.2 | 1 |
| **Total ICU RN** | **52** | **61.2** | **18** |
| Ward RN Level I | 5 | 5.9 | 5 |
| Ward RN Level II | 3 | 3.5 | 3 |
| Ward RN Level IV | 5 | 5.9 | 5 |
| **Total Ward RN** | **13** | **15.3** | **13** |
| ICU Intern | 3 | 3.5 | 3 |
| ICU Resident | 2 | 2.4 | 2 |
| ICU Registrar | 8 | 9.4 | 4 |
| ICU Consultant | 3 | 3.5 | 2 |
| **Total ICU Doctors** | **16** | **18.8** | **11** |
| Ward Intern | 1 | 1.2 | 1 |
| Ward Resident | 1 | 1.2 | 1 |
| **Total Ward Doctors** | **2** | **2.4** | **2** |
| Others | | | |
| ICU Ward Clerk | 1 | 1.2 | 1 |
| Bed Manager | 1 | 1.2 | 1 |
| **Total Others** | **2** | **2.4** | **2** |
| **Total** | **85** | **100.0** | **46 (54%)** |

As shown in Table 5, a total of 85 participants consented to participate in this research, of which 54% (n=46) were interviewed. All ICU staff (n=68) who worked on the observation days gave consent. A total of 30 ICU staff members who were involved in the discharges were later interviewed during or after the ICU patients were discharged. All consenting ward staff (n=15) were interviewed. A total of 56 interviews were conducted. Some ICU participants who gave consent to participate were not interviewed because they were not involved in any discharge processes during data collection. Some participants were interviewed more than once because they were involved in multiple patient discharges in this study. Interviews with the doctors and some Senior Nurses focused on the discharge process in general rather than on a particular case, because these participants were usually involved in multiple discharge cases in one day. The Bed Managers' work was observed formally during a continuous eight-hour day shift, when I "shadowed" a Bed Manager from 7:00 am to 1:30 pm and informally for many occasions when I was able to observe the bed management issues within the hospital.

RNs working in the ICU and on the wards included level I RNs (bedside nurses), level II RNs (often these nurses were in charge of the shift), and Level IV RNs (these nurses are nursing educators, and Nursing Unit Managers). Level III RN classification was removed during the recent Nurses Union enterprise bargaining agreements on nurses' wages. Some of the nursing participants were easily identifiable because there were only a small number of participants with these position classifications within this hospital. For example, there was only one ICU Nursing Unit Manager (NUM) and ICU Liaison Nurse within the hospital, and the educators and ward NUMs interviewed may also be identifiable within the interview context. To maintain participant anonymity, the nursing staff were grouped into two groups in the descriptions of the data analysis: 1) Senior Nurses, who held leadership roles including NUMs, Nurses in Charge, Level II RNs, Nurse Educators, and the ICU Liaison Nurse; and 2) Junior Nurses, including all Level I bedside RNs. The classification of each professional group in this hospital is explained in *subjects*.

The observations were carried out in the ICU and on all the wards that received patients from ICU during the observation period. A total of 28 discharges were observed. Among the discharges, 16 patients (57%) were discharged to surgical wards (five to general surgical wards, two to a urology surgical ward, and nine to the neurosurgical ward) while seven patients (25%) were discharged to medical wards (one to infections medicine, five to renal medicine, and one to respiratory ward); four patients (14%) were discharged home directly from ICU after waiting for ward beds for two to four days; and one patient (4%), who was to be discharged to ward for palliative care, died in ICU while waiting for a ward bed. To keep the wards anonymous in the text and in the participants' verbatim quotes in this chapter, alphabetical labels A to L were given to each ward. For the wards that housed patients under the doctors from different medical sub-specialties, the specialties were labelled as the letter with a number. For example, on ward C, patients were admitted under doctors from two sub-specialties, which were labelled as specialty C1 and C2.

The following sections of this chapter describe in detail the ICU patient discharge process under the guidance of the activity theory framework.

## The ICU Discharge Process

In the late 1970s Engestrom (1978) elaborated and consolidated the six components of activity theory and re-presented them into interacting activity systems to reflect the collective activity in complex work systems. The six components consisted of *subject, objective, tools, community, rules, and division of labour*. In large organisations, there are many interacting activity systems that are interdependent and collaborate to achieve their common goals. The findings of this research show that there were three main interacting activity systems in the ICU patient discharge process: the ICU discharge activity; the ward accepting the ICU patient activity; and hospital bed management activity (Figure 6).

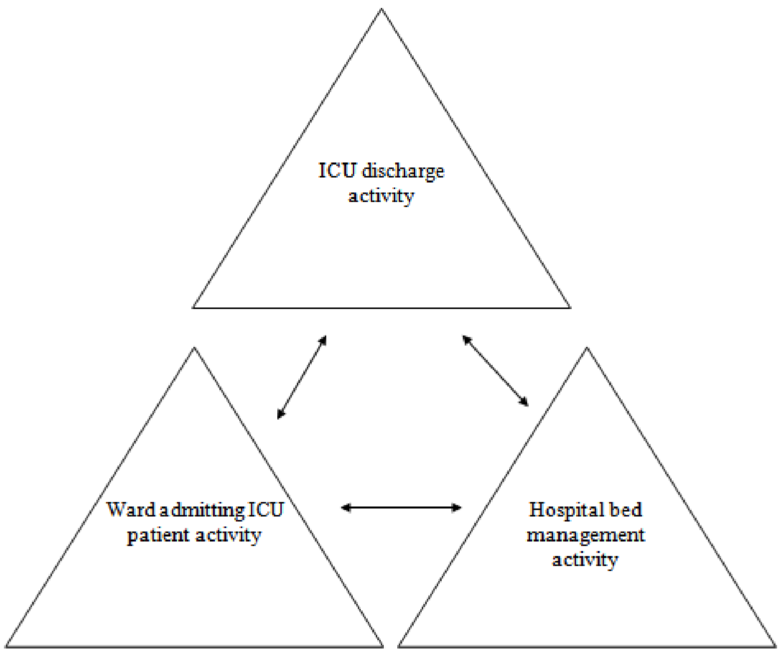



Figure 6 The interacting activity systems in ICU patient discharge

As illustrated in Figure 6, within each activity, the six components of each of the activity system were identified. Table 6 gives a summary of the *subjects, objectives, tools, rules, division of labour,* and *community* within each of the three activity systems and the rest of this chapter describes the multiple activity systems in the ICU patient discharge process using the six components as subheadings.

Table 6 Summary of activity theory components within multiple activity systems

| **Activity theory components** | **ICU discharge activity** | **Ward admitting ICU patient activity** | **Hospital bed management activity** |
|---|---|---|---|
| Subject | Discharge decision makers<br>ICU Consultants<br>ICU Registrars<br>ICU Senior Nurses<br>ICU Junior Nurses<br><br>Non decision makers<br>ICU Residents<br>ICU Interns<br>ICU Ward Clerks | Decision makers<br>Ward Consultants<br>Ward Registrars<br>Ward Senior Nurses<br><br>Non decision makers<br>Ward Junior Nurses<br>Bed Cleaners<br>Hospital Wardsmen [sic] | Hospital Bed Managers<br>ICU Senior Nurses<br>Ward Senior Nurses<br>Other hospital bed management decision makers |
| Objective | To discharge patient to wards as soon as possible | To balance the whole ward workload and patient load | To balance the bed demand within the hospital and from the community |
| Tools | ICU morning medical handover<br>Medical progress notes<br>ICU medical discharge summary<br>ICU to ward nursing handover<br>ICU nursing discharge summary | Form to document<br>ICU phone handover | Daily patient status print-out<br>HBCIS* (computer program)<br>Bed Manager (computer program)<br>Handover from Bed Manager to ward Senior Nurses |
| Rules | ICU discharge guidelines, and ICU discharge criteria | Allocating bed and admitting ICU patients | Capacity Alert; bed allocation rules |
| Division of labour | ICU subjects' roles and responsibilities in patient discharge | Ward subjects' roles and responsibilities in accepting ICU patients | Bed management subjects' roles and responsibilities in patient discharge |
| Community (staff from other departments) | Ward doctors, nurses and ward clerks<br>Bed cleaners<br>Wardsmen [sic]<br>Hospital Bed Managers | ICU doctors, nurses and ward clerks<br>Hospital Bed Managers | ICU doctors, nurses and ward clerks<br>Ward doctors, nurses and ward clerks<br>Bed cleaners<br>Wardsmen [sic] |

*HBICS: Hospital Based Clinical Information System

## Subject

As discussed in the methodology chapter, in this study, on the individual level, the term *subject* refers to the individuals who are involved in the discharge process. This includes individual ICU and ward doctors and nurses, hospital Bed Managers, ward clerks, wardsmen [sic], and bed cleaners. On the group level, each *subject* refers to a professional group that consists of a collection of individuals who have similar roles, responsibilities, and goals in the discharge process, such as ICU Consultants. The data analysis of this research used the collective activities of professional groups as the unit of analysis in order to keep each individual anonymous. Therefore in the following sections, *subjects* are presented as professional groups according to their job classifications. According to each professional group's involvement in the discharge decision-making process, the *subjects* are categorised under the following two categories: the discharge decision makers and non-decision makers.

In large organisations, many activity systems interact and have interdependent processes. The term, subject-producing activity systems, is used to denote factors that directly influence the subjects' performance. For example, participants' training influences their contribution to the ICU discharge process and is therefore labelled as subject producing activity. Thus the factors that contributed to the subjects' professional competence are described along with the descriptions of s*ubject*.

### The discharge decision makers

There were numerous medical and nursing staff members involved in the discharge decision-making process. The ICU consultants were the final decision makers, while the ICU Registrars, ICU Senior and Junior Nurses, the hospital Bed Manager, ward doctors, and ward Senior Nurses contributed to the discharge decision-making process. The details of the job classifications of each of the above professional groups are described below. The detailed roles and responsibilities of these participants are described in *division of labour*.

The ICU Consultants, also called Intensivists, are medical practitioners who have been trained in intensive care medicine. After graduating from medical schools, they firstly complete the internship, resident training requirements, and then obtain the intensive care certification by completing a six-year formal training program as Registrars with the Australian and New Zealand College of Intensive Care Medicine (CICM). In this thesis, the Interns and Residents are collectively referred to as Junior Doctors, while the Consultants and Registrars were referred to as Senior Doctors . There were seven ICU consultants on the weekly rotating roster in this ICU.

The ICU Registrars, including Senior and Junior Registrars, worked directly under the ICU consultants. CICM defines a Registrar as a medical practitioner appointed to a specialist training position after the initial internship and resident experience. The majority of the Registrars working in this ICU were specialist trainees from other specialties such as surgery and internal medicine who were doing an ICU rotation as part of their training program requirement. The length of rotation in this ICU for the Registrars was usually three to six months. A Senior ICU Registrar is a Registrar with increased seniority close to completion of specialist training (a reasonable expectation of completion of training within a year). The Junior ICU Registrars were the Registrars who had just started or were in the early stages of their specialist training. Both types of Registrars were often simply called Registrars in the hospital. Observation showed that the Registrars were contributors in discharge decision-making.

ICU Senior Nurses included the ICU NUM, the Nurses in Charge, the nursing Educators, and the ICU Liaison Nurse. All ICU nurses, including the Junior Nurses, were Registered Nurses who held Bachelor degrees in nursing. The majority of ICU nurses, including both Senior Nurses and Junior Nurses, had a postgraduate critical care nursing qualification. The ICU Junior Nurses (each was classified as a Level 1 Registered Nurse) worked at the bedside looking after patients.

The Bed Managers were responsible for bed allocations within the whole hospital. There was one Bed Manager on duty within the hospital on each shift. There were three shifts within the 24-hour period. The Bed Managers operated from an office located on the ground floor near the front of the hospital.

Another group of key contributors to the discharge decision-making process were the ward doctors who were responsible for the management of the patients presenting with medical or surgical problems prior to ICU admission, and/or after ICU discharge. They were often called the "treating team". Similarly to the ICU medical team, the ward treating teams usually consisted of the Consultants (specialists), Registrars, Residents, and Interns. The classification and specialty training for ward doctors were similar to ICU doctors. Each specialty has its own professional body to regulate the professional accreditation process. The agreement of ward treating teams on discharge decisions was imperative before the discharge decisions were made.

As with ICU Senior Nurses, ward Senior Nurses refers to the ward Nursing Unit Managers and the Nurses in Charge. When the ward treating team accepted an ICU patient, it meant that they agreed to take over the responsibility of caring for the patients after ICU discharge. However, the final decision to admit the ICU patients to the wards had to be made by the ward Senior Nurses who would decide whether the patient could be admitted into their wards according to resource availability, including beds and staffing.

**Non decision makers**

The non decision makers were the participants who were involved in the discharge process but had minimal input in discharge decision-making. This included ICU Residents, ICU Interns, ICU ward clerks, ward Junior Nurses, hospital Wardsmen [sic], and hospital Bed Cleaners. These participants often carried out tasks delegated to them. This section briefly describes these participants. Their detailed involvement is described in *division of labour*.

The ICU Interns were new medical graduates who were undertaking their first 12-month internship in the hospital. Their rotation in ICU was usually for six weeks. A Resident is a medical practitioner undergoing further training in a hospital after completing an internship but who has not commenced a recognised general practice or specialist training program. The length of rotation in this ICU for Residents was six to twelve weeks. The purpose of the rotation in ICU for the Interns and Residents was to give them some exposure to the management of critically ill patients. None of the ICU Residents and Interns was expected to make any decisions or have involvement in the discharge decision-making process due to their limited experience and expertise in ICU.

Ward Junior Nurses had the same basic nursing training as ICU Junior Nurses. They held bachelor-level degrees in nursing. No specialty postgraduate qualification was required to work on the general medical-surgical wards. However, in some specialty wards such as the cardiology and renal dialysis wards, some of the nurses had relevant postgraduate nursing qualifications. Although not involved in the ICU patient discharge decision-making, ward Junior Nurses' competency in looking after high-acuity patients discharged from ICU influenced the ICU discharge decision-making. This is further clarified in *division of labour*.

ICU Ward Clerks, hospital Bed Cleaners and Wardsmen were the last group of non decision makers. There was usually one Ward Clerk on duty in ICU on the day shift from 7:00 am to 3:30 pm. The hospital Bed Cleaners worked under their supervisors' instruction regarding ward bed cleaning. The Wardsmen worked under their supervisors to assist with the patients transfers within the hospital. These participants did not have any involvement in ICU discharge decision-making. However, they influenced the ICU discharge process by carrying out tasks efficiently or inefficiently. This will be further described in *division of labour*.

There were various allied health professional groups involved in ICU patients' care, including physiotherapists, speech therapists, and dieticians. These groups of staff worked with ICU staff closely on patient care, and had almost no involvement in the discharge process. Because of this, allied health professionals were not included in the sample.

## Factors influencing the subjects' competency

As described at the beginning of the *subject* section, "subject-producing systems" are factors that have a direct influence on the individuals' clinical performance and their understanding of the discharge process. The observations, interviews and examination of training documents revealed that the following factors influenced the subjects' competency: 1) ICU doctors' experience in ICU discharge process; and 2) ICU Junior Doctors' training and orientation.

### *ICU doctors' experience in discharge process*

The doctors working in ICU had various backgrounds and different levels of professional competence appropriate to their position. The Senior and Junior Registrars seemed much more confident than the Residents and Interns in patient care and decision making. The Interns had limited understanding about patient discharge in ICU. The doctors learned the discharge process mainly from their experience in ICU and more experienced ICU doctors had more autonomy in the ICU patient discharge process. For example, ICU Senior Registrars were sometimes given permission by the ICU Consultant to lead morning rounds independently, whilst Junior Registrars often followed the Consultants' lead. As the following field note revealed:

> The ICU Consultant did not follow the group. The Senior Registrar asked the Consultant: "are you happy for me to do the round?" The Consultant said: "Yeah". The Senior Registrar then started reviewing the patients with the Junior Registrar, the Residents and the Interns. (Field notes taken on 14 April, 2007)

### *ICU Junior Doctors' training and orientation*

Observation showed that bedside teaching and experiential learning were the main teaching and learning strategies used by the doctors.

> It will be from the Registrars I learn the most from, because we don't really spend very much time with the Consultants. We basically picked up [how to do the discharge paperwork] from experience. (Participant #1, ICU Resident)

The JFICM's "minimum standards for ICU" stated that level-three ICUs should have a documented orientation program for new staff. At the beginning of their rotation in ICU, new doctors were given an orientation booklet, *Intensive Care Unit Orientation Booklet for Medical Staff*, developed by the ICU nursing educators. The booklet included information on matters such as ICU admission and discharge procedures, but few Residents and Interns read it. As this intern stated:

> It [the orientation booklet] is useful. But it is a massive booklet; I have read only half of it... (Participant # 49, ICU Intern)

There was no other structured orientation for new doctors in the unit. New medical staff appeared extremely anxious during the early days of their rotation in ICU, perhaps due to the lack of understanding of the ICU process and procedures. Interns were often delegated to carry out tasks such as completing the discharge summaries without training.

In activity theory, *subjects* need to work towards one common goal to achieve the ultimate outcome: discharging ICU patients to ward safely. The following section describes the next activity theory component, *objectives*, that is, those held by staff from different departments and professional groups in the discharge process.

## Objective

In activity theory, *objective* refers to the goals the subject or subjects work towards in order to achieve the overall outcome. Observations showed that discharging ICU patients to free up ICU beds was usually given high priority by the ICU doctors, nurses and ward clerks. However, this objective was at times not shared by others including the hospital Bed Managers, ward doctors, and ward Senior Nurses. In this section, the findings will be described in three categories: 1) the ICU team members' objectives; 2) the hospital Bed Managers' objectives; and 3) the wards Senior Nurses' objectives.

**ICU team members' objectives**

ICU beds were often in high demand in this hospital. During the data collection, there were often patients waiting for ICU beds in other departments such as emergency department, operating theatre and the wards. According to the ICU's "performance indicators database", during the year of 2007, there were 48 "unable to admit" cases due to lack of ICU beds; available data show an upward trend in such cases since 2002. The ICU staff, including the ICU Senior Nurses and ICU Registrars, actively collaborated with the wards so that patients could be transferred to the wards as soon as possible. The ICU Senior Nurses regularly checked with the Bed Manager about ward bed availability for the ICU patients to be discharged. Once a bed was allocated on the wards, the ICU nurses usually initiated communication with the ward nursing staff and checked with them about the timing of patient transfer:

> …I was told there was a bed on ward C, so I rang immediately to find out what sort of timeframe they would be ready so that I could just get my paper work in order and get the patient prepared to go to ward, … I made two more phone calls to find out exactly what the problem was because time was passing…(Participant # 11, ICU Junior Nurse, on case 17)

In order to discharge the patients as soon as possible, ICU nurses utilised all possible wards beds whenever they became available, sometimes after-hours. As this ICU senior nurse stated:

> … there's no time limit [on how late a patient can be discharged to the wards]. If a bed became available in the middle of the night, and the patient was booked for discharge then we should utilise that bed - definitely. (Participant # 44, ICU Senior Nurse)

Thus, while the majority of the ICU patients to be discharged were transferred to the wards during daytime, some discharges did happen after-hours when there were fewer resources available. For example, one of the 28 discharged patients observed in this study was discharged to the ward at 9:30 pm when a ward bed finally became available, but resources on the ward such as medical and nursing cover were limited. According to the interviews with ward doctors, night duty ward Registrars did not routinely review the patients unless the ward nurses had concerns and paged them to see the patients. This meant that these patients, whose acuity could be higher than most of the ward patients, were usually not reviewed by ward doctors until the morning after ICU discharge according to ward nurses.

Observations revealed that the ICU team's objective to discharge patients from ICU as soon as possible was at times not shared by the hospital bed management staff. The following section describes in detail the reasons why the hospital Bed Managers held different objectives from the ICU teams.

**Hospital bed managers' objectives**

The hospital Bed Managers often faced competing demands for patient beds from all parts of the hospital, including emergency department, operating theatre, ICU and the patients coming from the community waiting for elective surgery. This hospital was at near full occupancy on most of the data collection days. The ICU performance indicator database showed that in 2007, 79 ICU patients experienced discharge delays due to lack of ward beds.

Although the Bed Managers communicated with ICU and other wards frequently every day to try to find suitable beds for ICU patients, they also needed to balance the demand of beds from other sources at the same time and consequently, the ICU patients were not always given priority by hospital Bed Managers in ward bed allocation. On many occasions the hospital Bed Managers allocated the much needed ward beds to patients from the community, who were being admitted for elective surgery, instead of giving them to ICU patients. As this ICU nurses recounted:

> She [the Bed Manager] knows she's got people coming in from the community for elective surgery, yet we might have had patients out here in ICU that have been sitting here waiting for a bed for a couple of days. The wards are totally unaware of this and so she'll put outliers [from the community] in there. (Participant # 4, ICU Senior Nurse)

At the same time, there seemed to be problems with bed allocation on the wards.  A shortage of ward beds meant that not all ward patients could be admitted into their appropriate clinical areas. Patients were sometimes put into other specialty areas temporarily to wait for a bed to become available in their clinical areas. These patients were called "outliers". As the following field note documented:

> There are 20 outliers total in the hospital today. Cath Lab has eight non-cardiac patients in there on telemetry that were admitted over the weekend. It's Monday morning now. The Bed Manager now has to try to get these patients out. There are eight Cath Lab cases booked today. These eight cardiac patients are already in the hospital in the cardiology ward. They have to cancel the cases if the outliers are not moved out soon. (Field notes taken on 20 August, 2007)

When the doctors in the Cardiology Department had to cancel the Cath Lab cases because the recovery room in the Cath Lab was occupied by "outliers", the cardiac patients waiting for this elective procedure had a prolonged stay in the hospital.

### Wards Senior Nurses' objectives

Accepting a patient from ICU was part of the overall objective for all the ward staff but it was not necessarily the priority for ward Senior Nurses. The ward Senior Nurses needed to consider a particular nurse's workload if an ICU patient was put into his/her allocated area, the needs of other patients in the same multi-bed room, and overall staffing levels and skill mix on the shift. Accepting ICU patients also depended on whether the wards, particularly specialty wards, had patients coming back from other wards. For example, specialty wards wanted to bring their outliers back to their wards as soon as possible for easier management.

In order to transfer the patients to the wards, participants had to use tools such as forms, notes, and summaries to facilitate information transfer. The following section describes the tools used in the ICU patient discharge process.

## Tools

In activity theory, *tools* are cognitive artefacts that support information transfer. Tools can be physical such as paper, computer, and telephone; or digital such as computer programs; or cognitive such as various forms of handovers for information transfer between teams. Observation showed that during the ICU patient discharge process, many tools from each of these categories facilitated the information transfer from ICU to wards. This section describes the tools in detail.

**Physical and digital tools**

The physical tools used by ICU and ward doctors and nurses included: 1) ICU medical discharge summaries; 2) medical progress notes; 3) ICU patient daily update list; 4) nursing discharge summaries; and 5) ward forms used to document received ICU handovers. Table 7 provides a description of these tools and summarises the findings about how the tools were being used or how effective they were in the discharge process. Common issues were found to be: 1) the majority of the medical staff did not know who read their tools; 2) the purposes of the tools were unclear; and 3) disagreements existed on how to use the tools. Ward forms used to document nursing phone handover from ICU were found to improve patient information transfer between departments.

Table 7 Physical tools used by doctors and nurses

| Tool Name and User | Purpose | Description | Findings | Verbatim / Field notes |
|---|---|---|---|---|
| **Medical discharge summary**<br><br>ICU doctors<br>Ward doctors<br>Ward nurses<br>GPs*<br>Allied health staff | To provide an overview of the patients' stay in ICU for health professionals taking over the patient care. | It is a two-page document that briefly outlines a patient's diagnosis, treatments in ICU, current medications and plans for further care. It is updated daily by the ICU doctors and finalised on the day of discharge. A copy is sent to the patients' GPs. The original copy is filed into the patients' record. This summary is a formal document and is part of the patients' medical records. | 1. There was no training on how to complete the medical discharge summary.<br>2. The doctors often relied on ICU nurses to remind them to complete this on time.<br>3. Most participants did not know who read the discharge summary or its purpose.<br>4. Ward nurses often referred to this discharge summary when they first took over the care of the ICU patient. | 1. ... as long as they've got a medical degree, they can probably read through a chart. They can fill things out and pick out so many points. I don't think it's necessary to train them. (Participant # 48, ICU Resident.)<br>2. I think it goes to the GP, no I don't particularly think it does… I don't think anyone else in the hospital refer to the discharge summary. (Participant # 2, ICU Consultant.)<br>3. ...I would quickly scan the medical discharge summary to get a glimpse look of the patient first...(Participant # 78 , ward Junior Nurse) |
| **Medical progress notes**<br><br>ICU doctors<br>ICU nurses<br>Ward doctors<br>Ward nurses | To document ICU patients' progress, care plan and ICU and ward doctors' discharge decisions | It forms the main part of a patient's hospital record. ICU doctors often documented "happy to discharge to ward if ward is happy" during morning rounds in progress notes, and ward doctors often wrote "happy to bring patient back to the wards if ICU happy". | 1. ICU nurses often identify the discharge decisions from the notes and relayed the information to the doctors.<br>2. Most ICU doctors thought no one read these notes. | 1. ...by the time the ICU doctors came to review this patient, the ward treating team had already seen the patient. The ICU Junior Nurse told the ICU doctors that "the ward doctors wrote in the notes that they wanted the patient back on the wards". (Field note taken on 17 April, 2007)<br>2. No one reads any of these notes [Medical progress notes]. (Participant # 2, ICU Consultant.) |

| Tool Name and User | Purpose | Description | Findings | Verbatim / Field notes |
|---|---|---|---|---|
| **ICU patient daily update list**<br><br>ICU staff<br>Bed Managers | To provide a brief update of all patients' progress in ICU. | ICU night duty Registrars updated all patients' condition on the computer. This was then printed out by the ICU Ward Clerk and distributed to all medical morning handover participants, and to the Bed Manager. | 1. It provided a summary of all patients' progress in ICU.<br>2. It was used to be sent to ward NUMs as well, but this was recently stopped.<br>3. Ward NUMs thought the form helped them to forward plan patient care. | … the intensive care daily printout... I can keep a track of how the patients are progressing and whether the time is coming nearer for them to be discharged from intensive care and into our ward. I don't get that list any more…they thought that the information on it was a bit too sensitive. (Participant # 31, ward Senior Nurse) |
| **Nursing discharge summary**<br><br>ICU nurses<br>Ward nurses | To provide ward nurses an overview of the care patients received in ICU. | It was designed by the ICU nurses after consultation with the ward nurses. Some content overlaps with the medical discharge summary. ICU nurses update this form each shift. It was not a part of the patients' permanent records. | 1. The design of the form was ambiguous – with some items needed clearer definition.<br>2. Disagreements existed among ICU nurses on how much information should go into the daily update section.<br>3. It was rarely referred to by ward nurses when patients arrived on the wards. | 1. On top of the first page, there was a title "Treating doctor". Some nurses thought this referred to the ward treating doctor; some thought it should be the ICU consultant.<br>2. Some ICU nurses wrote 1-2 sentences of brief updates; others wrote long paragraphs of whole patient condition report.<br>(All of above were field notes taken on 30 April, 2007) |
| **Ward form for documenting ICU phone handover (Appendix 7)**<br><br>Ward nurses | To ensure the ward bedside nurses receive basic information of the ICU patients and were aware of the patients that were to be transferred from ICU. | The ward nurses documented the received ICU phone handover information on this form. Then they allocated the ICU patient a bed accordingly. It was often kept in a designated area near the desk so other nurses could refer to it when needed. | 1. Not all wards had this form.<br>2. Different versions existed on the wards.<br>3. Handover information flowed better, and the ward bedside nurse received more information on the wards that had this form. | 1. Two of the specialty wards' nurses used a checklist-type form to take phone handover from ICU. The forms contained similar information. (Field note, 17 April, 2007)<br>2. We usually have a criteria sheet that we prompt ICU nurses when we get a handover so that we both know that we have got enough information…(Participant # 69, ward Junior Nurse) |

*GP: General Practitioners who treat patients in the community.

Another group of tools, as shown in Table 8, were the hospital bed management tools used by bed management staff to allocate ICU patients beds in other parts of the hospital. Bed management physical and digital tools included the following: (1) daily bed availability printouts, (2) the “Bed Manager”, and (3) “HBCIS” (Hospital Based Clinical Information Systems) computer programs. The hospital Bed Managers often used the printouts of daily bed availability as the primary tool. Bed availability information on this printout was the most up to date available from all the tools. It was a massive task to manage all patients’ admission and discharges in a 585-bed hospital by relying on this manual method. Observations and interviews revealed that the trial of “Bed Manager” program in the hospital had not been successful because of resistance from the wards’ staff. The hospital clinical information computer program – HBICS, which has patients clinical information function, was not being used effectively.

Table 8 Physical and digital hospital bed management tools

| Tool name and user | Purpose | Description | Findings | Field notes |
|---|---|---|---|---|
| **Daily bed availability print out**<br><br>Hospital Bed Managers | To show bed availability | The hospital Bed Managers printed this out from the HBCIS program at the beginning of the shift. It listed all the patients that were in hospital at 7:00 am on the day. | 1. Bed availability and demand were not transparent across the hospital.<br>2. Manual management of bed availability information on the print out made communication slow, delayed, and problematic on occasions. | 1. The Bed Managers updated the print-out using pens and highlighters. This left minimal time for them to update information on the computer system.<br>2. The Bed Manager forgot to update ICU about a ward bed availability, which contributed to a few hours of ICU discharge delay.<br>(All of above were field notes taken on 20 August, 2007) |
| **Bed Manger**<br><br>Bed Managers ICU/ward Senior Nurses Ward clerks | To show bed availability | The computer program was on trial. Ward staff were required to update bed availability information promptly on the system. The Bed Managers could access real time information from it. | The majority of the wards were uncooperative in using this bed management computer program. | 1. Nurses on some wards said they refused to use this program because they were too busy.<br>2. Nurses on one of the wards claimed they lost the passwords therefore they could not use the program.<br>(All of above were field notes taken on 20 August, 2007.) |
| **HBCIS***<br><br>Bed Managers, ICU/ward Senior Nurses, ward clerks | To show patient information and bed availability | A computer program used to manage its patient database. Patient information and predicted patient discharge date were some of the features of this program. | 1. The hospital computer program did not provide accurate, real-time information on predicted discharge.<br>2. It was not being updated in a timely manner by ward staff. | The HBCIS program currently in use had a predicted patient discharge date, but it was not accurate and was not updated regularly. (Field note taken on 20 August, 2007.) |

* HBCIS: Hospital Bases Clinical Information System

**Cognitive processes – handovers as tools**

Besides the physical and digital tools used, the handovers during the ICU patient discharge process were cognitive processes that were crucial for the transfer of information and responsibility from one team to another. The handovers were categorised as tools because of their characteristics of (1) having a clear structure; (2) helping the information giver and receiver to organise their thinking and activity; and (3) optimising the discharge process if information was transferred clearly and in a timely manner. This section focuses on the issues with clinical handovers including phone handovers and face-to-face handovers. Table 9 lists the findings of the four types of handovers used by the participants:  medical morning handovers, hospital Bed Manager to ward Senior Nurses handover, ICU to ward nursing phone handover, and face-to-face handovers. Although handovers in the discharge process were often a two-way communications with not only the information giver passing on information, the receiver also often asked questions in the process. The terms “from” and “to” in the “type of handover” column were used to show the direction of the transfer of responsibility, and also to distinguish the parties that were involved in the information transfer. “From” refers to the information giver who was trying to transfer the responsibility of caring for the patients to the receiver, the “to” party.

Table 9 Cognitive tools - handovers

| Type of handover | Purpose and description | Findings | Verbatim / Field notes |
|---|---|---|---|
| **ICU morning medical handover**<br><br>From<br>Night duty ICU Registrar<br><br>To<br>Day shift ICU doctors,<br>Senior Nurses,<br>other allied health professionals | Purpose<br>To report an overview and update of the patients' clinical conditions.<br><br>Description<br>It took place at 8:00 am in the x-ray viewing room. Patients' clinical conditions and changes that happened overnight were reported. Preliminary discharge decisions were often made at this stage. | 1. The morning medical handover usually took longer on Thursday mornings because it was the first day of the consultant on duty for the week-long rotation.<br>2. Length of the handovers varied greatly when different ICU Consultants were on duty.<br>3. Junior doctors claimed that short handovers did not provide enough information for them to understand how the discharge decisions were made.<br>4. Handover givers often considered the on duty Consultants' preferences on how much information to include in the report.<br>5. Some consultants stated that they liked shorter handovers because they worked differently from other consultants. | 1. The morning medical handover…the consultants, some like it short and brief, some like it to be more in detail. As Registrars we must consider who we are reporting to. (Participant # 83, ICU Registrar)<br>2. I had no idea about this patient…didn't get much info from the morning handover. (Participant # 49, ICU Intern)<br>3. [the reason I like short handovers] because when I'm on, I'll be in here at quarter to seven [while other Consultants usually arrive at 8am], I've already done a walk around so I already know what's going to happen. I've already spoken to the night nurses...the night Registrar is merely confirming what I've already seen… (Participant # 2, ICU Consultant) |
| **Bed Manager to ward nursing handover**<br>From<br>Hospital Bed Manager<br><br>To<br>Ward Senior Nurses | Purpose<br>To provide ward Senior Nurses some basic patient information.<br><br>Description<br>It usually took place once the Bed Managers decided where to send the ICU patients. | 1. The Bed Managers relayed the information from the ICU patient daily update sheet to the ward Senior Nurses.<br>2. Minimal information was provided in this process. Information often included the patients' name, age, and diagnosis.<br>3. Ward Senior Nurses claimed that this handover did not provide enough information for them to allocate the ICU patients ward beds. | … we get a very brief handover from the bed manager …has just a little bit of an overview from ICU, and they don't get a full handover and then we have to wait and get a full handover from ICU, then just sort of decide where we are going to put them…(Participant # 77, ward Senior Nurse) |

| Type of handover | Purpose and description | Findings | Verbatim / Field notes |
|---|---|---|---|
| **ICU to ward nursing phone handover**<br><br><u>From</u><br>ICU bedside nurses<br><br><u>To</u><br>Ward Senior Nurses | <u>Purpose</u><br>To transfer patient information from ICU nurses to ward nursing nurses.<br><br><u>Description</u><br>Once the hospital Bed Manager informed the ICU of ward bed availability, the ICU bedside nurses usually immediately contacted the ward's nursing staff and gave phone handover. | 1. This was the most comprehensive ICU to ward nursing handover in the discharge process.<br>2. The handover giver and receiver understood the purpose of the phone handover differently. ICU nurses perceived this handover was for the ward staff to plan the patients' care on the wards; ward nurses thought this provides basic information for them to allocate beds and staffing.<br>3. Some ward staff complained that ICU nurses did not provide enough information.<br>4. A large amount of information was lost during transition in most of the cases because of the different understanding of the purpose of the handovers. The loss of information contributed conflicts between ICU and ward nurses.<br>5. Ward bedside nurses received limited information because ward nurses who received ICU handovers did not pass on the information to bedside nurses. ICU nurses often were asked to give a repeat handover after patient transfer. | 1. Senior Nurses normally take the phone handovers from ICU…because we have to decide where to put that patient, if we have got to move beds around... and who is going to be looking after the patient. (Participant # 53, ward Senior Nurse, on case 7)<br>2. Today the handover was really good…it doesn't always happen that way…we often had to prompt and ask questions.(Participant # 81, ward Senior Nurse, on case 28)<br>3. I've had complaints from the ward staff when I've gone up there "we've just received this patient the [ICU] staff member that brought her up told us absolutely nothing." …(Participant # 4, ICU Senior Nurse)<br>4. I would tell them to ring the nurse who took handover from me from previous shift to get handover [if that person had already gone home]. I sometimes refuse to do it again, especially if I was having a bad day. (Participant # 70, ICU Junior Nurse) |
| **ICU to ward nursing face to face handover**<br><br><u>From</u><br>ICU bedside nurses<br><br><u>To</u><br>Ward bedside nurses | <u>Purpose</u><br>To give an update of patient care following the phone handover.<br><br><u>Description</u><br>It took place when ICU patients arrived on the wards. | 1. This handover was usually a brief update from the phone handover.<br>2. This handover did not happen on many occasions because the ward nurse was too busy or unavailable.<br>3. The handover was often interrupted by patients and other staff when it did happen. | 1. I didn't give her [the ward nurse who was going to look after the patient] as detailed a hand over as I had given to the nurse in charge. But again she seemed a little bit busy… (Participant # 50, ICU Junior Nurse)<br>2. The ward nurse didn't come to meet the patient. The ICU nurse couldn't give handover or introduce the patient to any ward staff. (Case 24 summary)<br>3. The patient kept asking for a glass of water during the nurses' handover. The ward nurse had to leave twice to get water and a straw. (Case 1 summary) |

Table 9 shows that there were variations in the length of morning medical handover, which was often influenced by the ICU Consultants' preferences. The Bed Managers to ward Senior Nurses handovers did not provide enough information for the ward nurses' bed and staff allocation to admit the ICU patients. ICU to ward nursing handover was problematic because of the different understanding of the purpose of this handover. The face-to-face handover between ICU and ward bedside nurses often did not happen. When this handover did happen, it was often interrupted by patients and other staff.

## Rules

In activity theory, *rules* refer to written and unwritten rules, policies and guidelines that control the behaviours of the people within a community. This section describes the organisational rules that influenced the ICU patient discharge process. Hospital level bed management rule, "Capacity Alert", is described first. This is followed by a description of the departmental level rules including ICU discharge guidelines, protocols, and discharge criteria. Lastly, informal ward rules on allocating ICU beds are presented.

### Capacity Alert (Code Yellow)

The research setting was a two-campus public hospital, which covered an area with a population of more than 500,000. Bed shortage was constantly on the healthcare planning agenda and in the news. The government health department and the hospital management adopted various strategies to combat the problem. A long term plan to relief this shortage was to build a new hospital in the area, which may increase the number of beds significantly. In the short term, the hospital management adopted various interventional strategies recommended by the health department, such as utilising short stay units overnight, opening of a discharge lounge, utilising overnight beds in areas that were not operating, off-site transitional care arrangements with other facilities, improving patient flow within the hospital including emergency department, and expedite hospital discharge process on the wards. The use of ICU liaison nurse has been in place for almost 10 years as a result of an interventional study on discharge delays. At the time of data collection, the hospital was actively addressing the deteriorating patient issue. A night shift nurse consultant was employed to identify deteriorating patients and liaise with ward doctors.

However, the number of beds can be utilised was limited. Discharging patients to home sooner became a priority. Capacity Alert was frequently used during the data collection when the hospital was at full capacity. Discharge lounge, a facility created to relief the ward resources, was not used effectively. This will be described in Chapter 6, under the theme *Failing to enact organisational processes*.

"Code Yellow – Capacity Alert" announcements were frequent during the period when the observations took place. The ICU patients to be discharged to the wards often had to wait for a ward bed. The wards were often either full, or had patients who were to be discharged home still in their beds waiting for the completion of the ward discharge process. Discharging patients from hospital to vacant ward beds was a priority for the hospital management staff. When there was no physical bed available to admit patients, a "Capacity Alert' announcement would be made via the hospital intercom following a strict approval process by the hospital management team. As this ICU nurses confirmed:

> The Bed Manager has to talk to the Medical Superintendant to decide the Capacity Alert. It has to go through to the highest level to get approved to make the announcement. (Participant # 44, ICU Senior Nurse)

A Bed Manager stated that “the doctors know what they should do if we have Capacity Alert. During orientation they get information about responses needed for Capacity Alert. Action cards were developed for different departments” (Appendix 9). These action cards clearly stated which actions should be taken by various levels of hospital staff when Capacity Alert was announced. When asked “what do you usually do after the capacity alert was announced”, these participants said:

> Honestly I think everything stays the same on the wards – Capacity Alert or not. I mean we wouldn’t try harder or more proactive to discharge patients. Because we would discharge the patient if it’s appropriate…(Participant # 1, ward Resident)

> The Capacity Alert means nothing. I don’t know why they do it. Because you know it’s not as though we hang on to patients for the fun of it. Everyone just ignores it…(Participant # 83, ICU Registrar)

Participants agreed that there was a lack of input from the ward level staff in relation to the decision to call a Capacity Alert. As this participant revealed:

> It's over used. No one cares anymore. No one contacted this ward [before this announcement]. We have one spare bed. (Participant # 31, ward Senior Nurse)

The outcome of the announcements of Capacity Alert was not communicated with hospital staff. A Bed Manager confirmed that they never cancel a Capacity Alert. No formal feedback process was in place to show the effect of the announcements. The observation showed that this Capacity Alert announcement was a time-consuming process that did not appear to make any obvious difference to the work undertaken by staff or the bed block situation.

**ICU discharge guidelines and discharge criteria**

The *Minimum Standards for ICU*, published by JFICM (2003), suggested that all Australian ICUs should have patient discharge guidelines. Consistent with this recommendation, this ICU had admission and discharge criteria guidelines. The guidelines (Appendix 10) used the "priority criteria" suggested by the American Society of Critical Care Medicine (SCCM), in which patient priority categories of 1-3 were used. It was located on the unit's computer hard drive. Hard copies were filed in a folder called "ICU workplace guidelines, policy, and procedure manual", which was kept in the cupboard near the nurses' stations.

Only a small number of participants interviewed knew the existence of the written discharge guidelines. The majority of the medical staff, especially the Junior Doctors, did not know of its existence. The limited number of Registrars who knew the guidelines said they found it hard to find what they were looking for in the folders. As this participant stated:

> …That's just a verbal general guideline that I've been given. A lot of them (ICU policies and manuals) are kept near the computer there so I do know where some of them are. But sometimes there are you know I do have difficulty finding what I want to find in those folders. (Participant # 83, ICU Registrar)

> Discharge guidelines and protocols… Not as like on a documented piece of paper. I know it's really up to the doctors. (Participant # 44, ICU Senior Nurse)

Consequently, most of the doctors did not know the discharge criteria. It was widely agreed that the discharge decision was based on the patients' clinical condition, not according to the guidelines. However, most of the doctors stated that their understanding of the discharge criteria was parameter-based not priority-based, for example, if the patients were haemodynamically stable. Priority-based discharge guidelines focus on whether the patient will benefit from ICU services.

The following examples of interviews show that Junior Doctors had a basic understanding of which patients could be discharged, but they were not clear if their interpretations were right. An ICU Registrar also stated that sometimes discharge criteria were influenced by the bed pressures:

> … when they [the ICU patients] no longer need one-on-one nursing…no longer need intensive intervention such as Inotropes, dialysis, ventilation… Gas exchange is adequate, haemodynamically stable…But you know it seems like a subjective decision. (Participant # 82, ICU Intern)

> It's quite difficult to put a finger on that [discharge criteria] because you know they won't kind of list observations or values and say therefore they're suitable for the ward, it's just a whole general picture and progression. The discharge decisions are not just purely protocol and guideline driven, and a lot of it is what you, just your own clinical opinion. But it's not always that clear and depending on bed pressures and everything else, that all factors in too. (Participant # 3, ICU Senior Registrar)

When asked if the discharge criteria were consistent among the ICU consultants, junior medical staff and nursing staff claimed that there were variations among the consultants in discharge decision-making, a statement not endorsed by the Consultants:

> …yes, there are variances among the consultants. Say a particular patient, some [ICU Consultants] may discharge the patient while others may like to hang on to the patient for one more day just to make sure the patient is going to be ok…(Participant # 83, ICU Senior Registrar)

> There are differences…most definitely. I guess they just have different levels of tolerance or parameters, and some are more conservative than others…(Participant # 54, ICU Senior Nurse)

> …we usually agree on what patients to discharge from ICU. Because we're pretty soft here – patients stuck here for days. We're usually pretty agreeable. (Participant # 84, ICU Consultant)

The ICU Consultants unanimously agreed that after-hours discharge was best avoided. When after-hours discharges were unavoidable, the discharge decisions were made in consideration of the patients' clinical condition, as well as the discharge destination ward's characteristics. For example, if the ward treating team would be willing and able to look after a patient with higher acuity and if the level of nursing care the patients needed could be provided by the receiving ward's nursing staff, an ICU patient could be discharged to these wards. The ICU doctors were aware of the fact that some ward treating teams did not review their patients regularly after-hours or during the weekend. When the demand for ICU beds out-numbered the available beds, ICU Consultants had to decide which patient needed the ICU service the most. This method is called admission and discharge by triage. Discharge by triage, which often happened after-hours:

> Yes, we do discharge ICU patients to ward by triage sometimes, but as long as they no longer need full system support… Occasionally I discharged the patients who I would have preferred to keep them in ICU a bit longer, when there was a sicker patient waiting for an ICU bed in emergency department. (Participant # 84, ICU Consultant)

> If the ICU's completely full and there's someone really sick being transferred or coming in from emergency then Senior Registrar or most likely the Consultant has to triage who's the least requiring ICU, and who could be discharged to ward. (Participant # 48, ICU Resident)

When after-hours discharges had to occur, ICU Registrars often visited patients a few hours after the patients were discharged from ICU, to ensure their safety.

> …if there is a patient [waiting for ICU bed] that is more sick and the other [ICU] patient has a relatively safe environment to go to on the ward, then I would make sure that the handover process to the ward staff is very clear. …telling them the patients would need more frequent reviews and higher level of care… then I would go up and see the patient a couple of hours after they're discharged, …my impression is that we don't compromise the care of a patient we have already got to take a patient that we don't have a bed for. (Participant # 83, ICU Registrar)

However as described under *Objectives*, no special arrangements were in place for patients whose discharge decisions were made during the day (routine discharges) but had to wait for ward bed for hours, eventually being discharged to the wards late at night. The ward night duty doctors did not routinely review these patients if the ward nurses did not raise any concerns.

**Ward rules allocating beds and accepting ICU patients**

The ICU discharge decision was not final until the accepting wards allocated the patients beds and agreed to take the patients. There were a few informal rules from the wards that influenced the ICU patient discharge process. First, a few of the wards preferred to admit the ICU patients to private rooms, an unwritten rule that ICU participants often did not agree with. The following interview shows the arguments among ICU and ward staff:

> …probably about 7 out of 10 patients that I get from ICU I try to put them in a single room, even though a very clear picture is given to me from ICU they could be put into a bay. But you look at them... they've got the CVL [central venous catheter], they've got an ICC [intercostal catheter], and that does sound simple but if you're one of the six patients in a six-bed bay looked after by one nurse, you know what I mean. (Participant # 43, ward Senior Nurse)

> Our [ICU] patients always seem to go into a single room [on the wards after discharge] and I think maybe the wards perceive our patients need much higher care and much higher dependency when in fact I don't think that's the case. (Participant # 11, ICU Junior Nurse)

ICU patients often waited for hours for the wards beds to be ready, while the wards often spent considerable amount of time and energy to move their patients around so they could vacate some single rooms to accommodate the patients from ICU:

> … I have to move patients around so I can put the incoming ICU patient into single rooms….also looking at different acuity and different bays to make sure the nurses' workload is manageable. (Participant # 31, Ward Senior Nurse)

Another unwritten rule was that some ward Senior Nurses did not like to accept the ICU patients on Friday and the weekends, and also requested to have 24 hours notice:

> I said I need at least 24 hours or more [to be notified of the possibility of getting an ICU patient] if they have a trachy… because that patient would be nursed one-on-one. Ideally I don't like them coming out of ICU on a Friday because there is less chance of getting more staff and there's more support staff around during the week. (Participant # 43, ward Senior Nurse)

These unwritten rules could be a challenge for ICU staff because sometimes patients' condition improved quickly over a 24-hour period and they did not have the opportunity to notify the ward nurses. ICU patients often had to stay in ICU for an additional day so ICU staff could give ward staff sufficient notice.

## Division of Labour

The next activity theory component, *division of labour*, refers to how the responsibilities and tasks are divided and shared among members of the community. The ICU discharge process followed a routine. During the informal interviews and from the observations, multiple patient journeys in the discharge process were drawn. Figure 7, drawn from informal interviews with two ICU Interns and an ICU RN, which was further confirmed and revised according to the majority of the participants' drawings, shows a typical patient's journey in the ICU discharge process from admission to discharge. In this section, how responsibilities and tasks were divided and shared among hospital staff within ICU, the wards, and other departments of the hospital is described according to the steps shown in Figure 7. Since handovers, including medical morning handovers, Bed Manager to ward nurses handovers, ICU to ward phone and face-to-face handovers were described in *tools*, the participants' responsibilities in handover are not described in *division of labour*. Instead, this section focuses on the roles and responsibilities of staff in the discharge process.

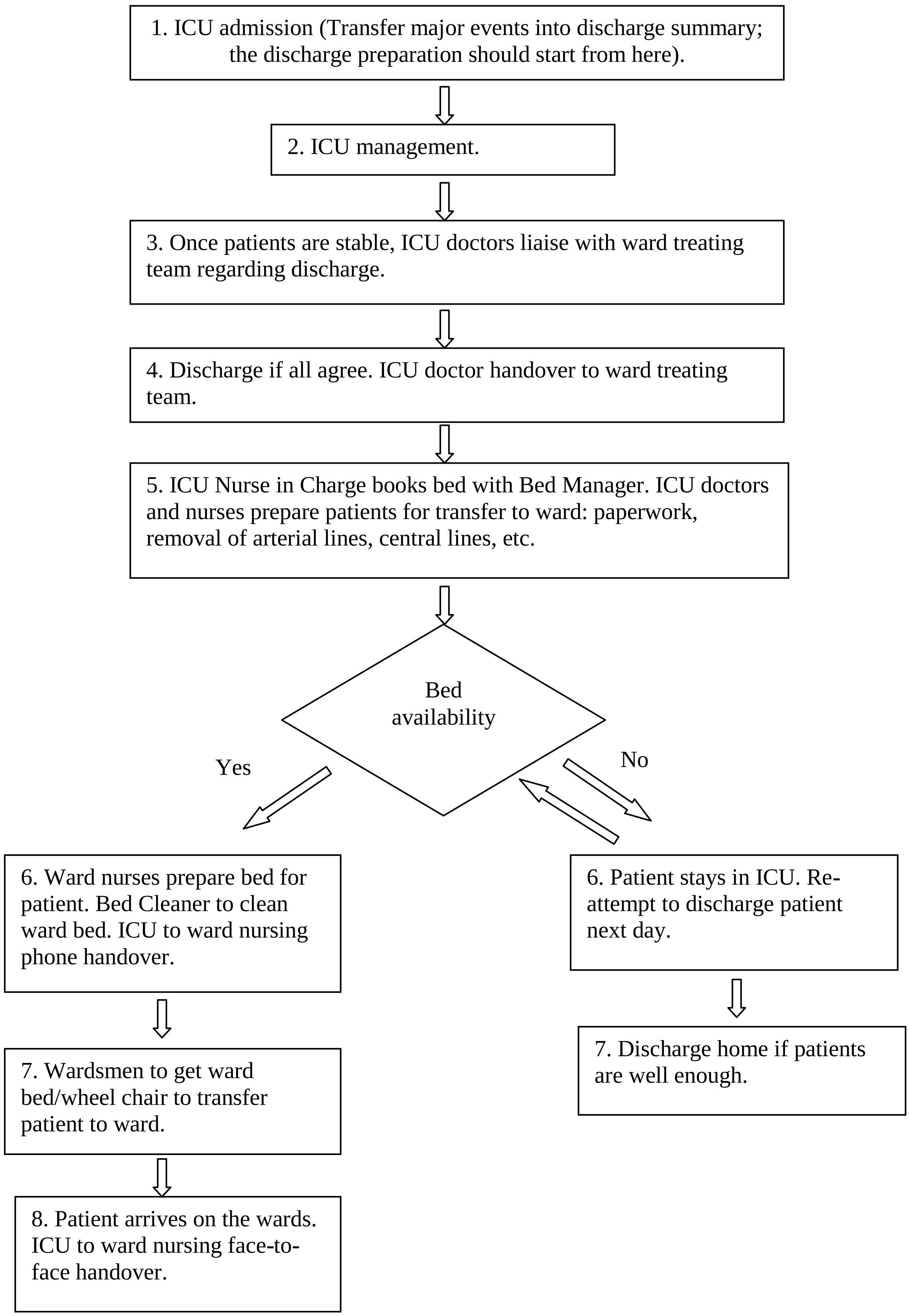



Figure 7  The ICU patient discharge process map

**Step 1 & 2: Before discharge decisions were made – roles and responsibilities of ICU doctors and nurses**

As soon as a patient was admitted into ICU, a medical discharge summary was started by the night duty Registrar. Then the day shift registrar delegated the Residents or Interns to update the discharge summary each day. ICU Registrars work directly under ICU Consultants' guidance. As stated in the ICU Manual, Senior Registrars under the ICU Consultants' supervision, have the responsibility to: 1) run the unit; 2) supervise junior staff; and 3) provide consults to ward and emergency departments and manage patients in other departments within the hospital before ICU admission. The observation showed that all the ICU Registrars understood their responsibilities clearly. They carried out tasks such as ICU patient management, documentation, delegating tasks to team members, educating junior medical staff, liaising with ICU nursing staff, and liaising with ward treating teams regarding patient admission, treatment, or discharge.

As with the doctors, ICU nurses usually started a nursing discharge summary for each patient as soon as the patients were admitted. This was then updated daily by nurses on each shift following the patient's admission. The ICU Liaison Nurse assisted bedside nurses to solve patients' problems such as social issues before the patients were discharged to the wards. However, little patient discharge planning took place in this unit. ICU nurses' involvements in discharge, other than updating the nursing discharge summaries, were mainly the preparation of the patient on the day of discharge.

**Step 3 & 4: Discharge decision-making – the roles and responsibilities of ICU doctors, ward doctors, and ICU nurses**

The 2009 edition ICU manual states that ICU Consultants are responsible for ICU patient admission, discharge, and treatments in intensive care and the supervision and training of all other medical staff. This research confirmed that the ICU Consultants were the final decision makers in ICU patient discharge. The on duty Consultant was usually present during the day from 8:00 am to late afternoon (usually until 5:00 pm), and was on call after-hours. They had to approve all admissions and discharges to and from this unit. Observations showed that preliminary discharge decisions were often made at the medical morning handover by the ICU Consultants, and their decisions usually concurred with those of the Registrars. The following statements were examples of the typical responses from most of the interviewed participants:

> The Consultant has got to approve who comes in and out of the department. We can't discharge anyone without their permission. (Participant # 34, ICU Resident, on Case 1)

> It's usually the Consultant [who makes the discharge decision]…A lot of the time they'll be 90% sure just in handover meetings at 8 o'clock. (Participant # 3, ICU Registrar)

During ward rounds on the day of discharge, most of the Consultants assessed the patients, and taught the junior staff at the bedside. Some often did progress notes and discharge summaries, and showed Junior Doctors how to do these tasks. As the following case summary and interview showed:

> After he showed the Resident how to assess the patient, the Consultant dictated the discharge management plan to the Resident who wrote the same in the progress notes. (Case 17 summary)

For non-standard patient discharges such as high acuity patients, and patients to be discharged on “do not resuscitate” orders, the ICU Consultant normally liaised with ward Consultant. Otherwise the ICU Registrars often communicated with ward treating teams regarding patient discharge:

> If I have a patient that is just a routine then the Registrar does the talking [to the ward Registrars]. But if there’s something out of the ordinary, or there’s limits placed, then it’s done Consultant to Consultant level so the two bosses know what’s going on… limits such as not for resuscitation, limits for therapy [on palliative care]… (Participant # 2, ICU Consultant)

> …spoke to the ward Registrar this morning in the ward round that this patient was coming. I asked if they were happy to receive them. (Participant # 83, ICU Registrar)

The interviewed Registrars believed that they contributed to discharge decision-making by making recommendations and providing summaries of the patients’ conditions to the Consultants during medical handovers, ward rounds and other patient reviews. The Registrars stated that they learned how the consultants made discharge decisions by observation as well as from their professional experience as Registrars on the wards. As stated by this Registrar:

> I can give my recommendation about whether I think a patient is safe for discharge or not, but ultimately the decision is made by the Consultant…I learned what patients can be discharged from ICU through observation and experience, and also because I’ve worked as a Medical Registrar on the ward, like I think ‘would I be happy to look after this patient on the ward or not’. (Participant # 83, ICU Registrar)

Confirming the discharge with ward staff involved two steps: ICU doctors first needed to gain ward treating teams’ acceptance to take over the responsibility for patient care, and then ward Senior Nurses made decisions to admit the patients into their wards according to their resource availability. The way ward treating teams interacted with ICU differed from specialty to specialty. Doctors from medical wards rarely came to ICU and reviewed their patients. The ICU doctors' phone handover was often the first time they heard about the patients. Surgical teams often reviewed their patients in ICU on a daily bases, and they often reviewed the patients prior to making the discharge decisions. Most of the surgical teams reviewed their patients early in the morning and communicated with ICU staff regarding the discharge.

When making discharge decisions, if a patient was sicker than usual and ICU doctors were unsure if it was appropriate to discharge a patient to the wards, ICU doctors requested the ward treating teams to review the patient before the discharge decision was made. Occasionally discharge decision-making was delayed because the surgical teams couldn't review the patient until late morning. The majority of discharge decisions were initiated by ICU Consultants. However, on one occasion, a surgical ward doctor initiated the discharge decision when the ICU Consultant did not plan to discharge the patient. The ICU Consultant agreed and decided to discharge the patient eventually.

When multiple ward treating teams were involved in an ICU patient's care, issues often arose regarding which team would be the patient's primary treating team. A primary treating team needed to be confirmed before the patient was discharged to the wards because this team had to liaise with other ward teams on the patient's care post ICU discharge. Clarification of the primary treating team was overlooked at times. ICU nurses often played an important role in ensuring this was addressed before the patient was discharged. The following field note showed this:

> ICU patient [case 19] was to be discharged to the ward today. A doctor from ward C suggested ICU to refer the patient to a physician from another specialty as well as to ward C. The ICU Registrar said, “Do you want to take the patient first and then decide what happens?” The ICU nurse said to the ICU Registrar: "You really should clarify that [who is the primary treating team] before the patient goes, so there’s someone looking after the patient as a whole patient not just their [specialty] bit." (Field note taken on 24 April, 2007)

The ICU Senior Nurses and the Bed Manager communicated often early in the morning to find ward beds for the ICU patients. Then the Senior Nurses usually attended the morning medical handovers when the preliminary discharge decisions were made. The observation of the morning handover confirmed that the ICU Senior Nurses were regular contributors to preliminary discharge decision-making, particularly in providing information on ward bed availability. The following field note about a dialogue from the morning handover shows how the Senior Nurses contributed to discharge decision-making at the morning medical handover:

> [During an ICU medical morning handover]:
>
> ICU Consultant: We might discharge the patient today. Any problems nursing wise?
>
> ICU Senior Nurse: Not that I am aware of…I have checked with the Bed Manager. Ward B possibly will have a bed by midday…(Field notes taken on 10 April, 2007)

ICU bedside nurses often joined ward rounds and reported the patients’ conditions to the doctors. ICU patients and their families had little participation in the discharge decision-making process. They learned of the discharge decisions from various sources. The surgical ward teams sometimes told the patients the discharge plans. ICU doctors sometimes informed the patients about the discharge and told the patients which ward team would be looking after them, while on many occasions ICU nurses were the first ones to inform the patients and the families of the discharge.

**Step 5: Preparing patient for discharge – ICU and ward doctors, ICU nurses, Bed Managers and Ward Clerks**

Once the discharge decisions were made, the preparation of the ICU patients for discharge began. The interviewed ICU doctors knew their roles and responsibilities well, with the occasional cross-tasking. The medical paperwork was usually ready before ward beds were ready. The following interview confirmed that the Junior Doctors were aware of their responsibilities:

> I have to do discharge summary from ICU, fluid chart, and change medications from IV to orals before the patients are discharged. (Participant # 34, ICU Resident)

Observations and interviews showed that the doctors' responsibilities may need clarification in some areas. As the following field notes and interview showed:

> There was a dispute about the IV therapy orders. An ICU Senior Nurse wanted the Registrar to transfer the ICU fluid orders to the ward chart before the patient was transferred to the ward. The Registrar said, "I wouldn't order anything. I'll leave it to the ward Registrar and their Consultants to decide". But the nurse said, "We can't send a patient to the ward without an intravenous order when they actually have something running". The Registrar just dismissed this conversation. I noticed that the IV fluid wasn't ordered at the time we transferred the patient to the ward. (Case 16 summary)

ICU nurses and ward clerks routinely checked the discharge paperwork to ensure they were completed properly before the patients were transferred out to the wards. As the following interviews confirmed:

> … mostly we try and get the night-time Registrar to do it at night if they're thinking this patient might need to go [to be discharged the next day], if the doctor has time. At least and do as much as they can and the other doctors in the morning will complete it, sign it,

> then it’s all photocopied and put in an envelope for the ward clerk. (Participant # 46, ICU Junior Nurse, on case 2 and 7)

> …We tend to delegate the tasks at the start of the rounds in the morning. Occasionally things get missed but the nurse is always the last one to check… (Participant # 3, ICU Senior Registrar)

The ICU Nurse in Charge on the shift was the key person in bed management in the ICU. She/he liaised with the Bed Manager to locate ward beds for ICU patients. ICU nurses knew their roles clearly during this process, as the following interview revealed:

> We [bedside nurses] don't get involved in chasing for ward beds. The nurse in charge gets the word from the co-ordinator of where the bed is. We get allocated a bed and then we organise it after that. We ring the wards to handover. Then we let the patient know what’s happening as well. (Participant # 38, ICU Junior Nurse, on case 2)

ICU bedside nurses prepared patients for discharge as soon as the discharge decisions were made. There were nursing progress notes to be completed, the nursing discharge summary to be updated, patients to be washed, dressings (if any) to be changed, lines such as central venous lines and arterial lines to be removed, phone handover to the ward nurses to be undertaken, and the discharge checklist with the patients to be gone through. Experienced nurses usually completed these preparations promptly before the ward beds became ready.

Patients to be discharged were often seen by numerous teams such as doctors from different specialties and speech therapists. ICU bedside nurses were with the patients all the time while other professionals such as ICU doctors and ward doctors came and reviewed the patient periodically. Some of these teams might come and see the patients and then write notes in the patients’ medical record without speaking to the ICU doctors in person. Therefore the ICU bedside nurses played a key role in ensuring all information was communicated among the different teams. As this case summary documented:

> …the ICU doctors decided to cease the heparin at midday at the morning rounds. But the bedside nurse said, "The surgeons wrote to stop at 24hrs in the notes, which means it should finish at 3 pm". The Registrar went back and checked the surgeon's notes, and said "OK that's right let's stop it at 3 pm then". (Case 24 summary)

ICU bedside nurses appeared to actively contribute in the discharge decision-making process, even though they claimed they did not make any discharge decisions. At the ICU morning rounds, there were often discussions between the ICU doctors and nurses when deciding what lines and medications to continue, and what to remove before the ICU patients were discharged. ICU nurses, especially the experienced nurses, often made suggestions to the doctors. The following case summaries showed this:

> …the ICU doctors talked about the IV [intravenous] infusion and told the nurses the patient is going to have 100 mls/hour of Hartman's solution. However, the nurse suggested: "Oh no the patient is actually drinking quite well and may not need that much infusion". Then the doctor said, "Then we can stop it then". (Case 24 summary)

However, there were occasions when some participants were not clear about their own roles and responsibilities. As this case summary shows:

> The Senior Registrar wrote "to leave IV cannula". An ICU Senior Nurse said, "It is not your job to plan to leave the IV cannula in or not. It's our job. We decide that before the patient goes to the ward". (Case 21 summary)

The ICU Registrars and Residents followed up further tests and results before the patients were discharged. However, the observations showed that no further patient review took place in ICU after the patients was confirmed to be discharged after the ICU morning rounds. Some patients often waited for ward beds for hours in ICU. Unless the nurses voiced any concerns about the patients, ICU doctors did not routinely check on the patients' discharge status. When the ICU doctors did the afternoon rounds at 4:00 pm and if the patients to be discharged were still in ICU, they often said that "this patient is waiting for ward bed" and did nothing else.

When there was no bed available for a patient who was ready to be discharged to the wards, the patient remained in ICU. The ICU Nurse in Charge would liaise with Bed Manager to discharge the patient next day. In some cases, the patients stayed in ICU up to three days after being deemed ready for discharge to the wards, and some patients were discharged home directly from ICU.

**Step 6: Preparation of ward beds for ICU patients – roles and responsibility of ward doctors, nurses, and hospital bed cleaners**

In most of the observed discharge cases, ICU patients were ready to be discharged long before the wards beds were ready. Observations showed that the reasons for this wait were: 1) waiting for ward patient to be discharged home to vacate the ward bed or the room; 2) waiting for ward to vacate a single room; and 3) waiting for the bed to be cleaned by the hospital Bed Cleaners.

Ward patients ready to be discharged home often waited for discharge scripts, to be seen by the specialists, or had tests results to be reviewed by the doctors. According to the interviews with ward Senior Nurses and from observations, most of the ward medical teams routinely did their rounds early in the morning. But often they did not complete aspects of the discharge process such as discharge scripts, discharge paperwork, and following up of further tests before the patients could be discharged home. Consequently, hospital discharge was delayed and resulted in ICU discharge delays. Some wards had increased number of residents, who normally wrote discharge scripts, in order to complete the discharge work faster. But according to some ward Senior Nurses, increased number of Residents in some wards did not solve the "waiting for script" problem.

When ICU nurses queried why the beds were still not ready, they were often told that the beds were to be cleaned by the hospital Bed Cleaners. The following interviews showed how the bed cleaning system worked within the hospital:

> … there is a paging system … for the wardsmen [sic] and cleaner requests. The ward nurses click on the bed cleaner tab and put in what beds they need cleaned and she'll [the Bed Cleaner] just add that to the back of her list… as opposed to the fact that this is an ICU patient, we might be expecting a post-op or we might be expecting a patient from ED… They have no idea. It's just a bed as good as it is anybody else's. So if the ward doesn't push it we will just have to wait… (Participant # 47, ICU Junior Nurse)

A ward Senior Nurse stated that if a particular bed needs to be cleaned urgently, the wards could contact the on-duty bed cleaning supervisor to have it cleaned quickly. According to some staff members who had used the priority bed cleaning service, the beds normally were cleaned quickly after placing the urgent request. However, on the occasions when ICU waited for hours for wards beds to be cleaned, the wards did not send priority requests to the bed cleaning supervisor. ICU nurses were often frustrated by waiting for ward beds to be cleaned:

> The next patient [coming into ICU] was waiting in recovery for me so I just went up [to the ward] and washed the bed while I was up there in three minutes… (Participant # 47, ICU Junior Nurse)

> … it's been two and three quarter hours and I've been told simply it was a bed shuffling exercise. But then it became a bed cleaning exercise – they were waiting for the bed to be cleaned. (Participant # 11, ICU Junior Nurse)

Ward bed areas for the incoming ICU patients were not appropriately prepared in most of the cases observed in this study. There was often no oxygen tubing, no water when the patient was eating and drinking, and no chair in the rooms. Prior to patient transfer, ICU nurses often informed the ward nurses that the patients would require an IV pump. However, the ward nurses often had to search for a pump after the patients arrived on the wards. Only on a small number of occasions (4/27 cases) were the ward patient rooms fully ready for the patients. The following interview was an example of the documented poor preparation on the wards:

> I'd say just about 100 percent of the time when you get there they haven't done anything to prepare for this patient to arrive other than have the bed washed and made. That's it. When you handover on the phone you always tell them that they've got fluids going you know IV fluids so they'll need a pump, and they never have a pump ready so yeah that's fairly typical. (Participant # 50, ICU Junior Nurse)

**Step 7: Transferring patient to ward – roles and responsibilities of ICU nurses and Wardsmen**

Once a ward bed was ready for the ICU patient, ICU bedside nurses would inform the hospital Wardsmen to bring the ward bed or a wheel chair, depending on the patient's mobility, to help with the transfer. Wardsmen were employed by the hospital, managed by the hospital wardsmen supervisor. The Wardsmen carry out the task according to the information received on their pager. The Wardsmen usually arrived in ICU within five to ten minutes of the ICU nurses' request. The ICU bedside nurses companied the patients during transfer with the help of hospital Wardsmen.

**Step 8: Patient arrive on the wards – roles and responsibilities of ICU and ward nurses**

When the ICU patients arrived on the wards, ICU nurses usually attempted to give face-to-face handover to ward nurses. However, the ward nurses were often busy with other patients. As described in *tools*, the nursing face-to-face handover often did not happen for this reason. As this case summary documented:

> The ward nurse didn't come to meet the patient. The ICU nurse couldn't really introduce the patient to any ward staff and she couldn't even show the patient where the buzzer was because there wasn't one. (Case 24 summary)

In summary, limited discharge planning took place in ICU. ICU Consultants made discharge decisions and also carried out educational activities during rounds. The ICU Registrars learned how to make discharge decisions by observing how the Consultants work. Discharge decisions, especially for after-hours discharges, were influenced by patients' clinical conditions as well as discharge destinations characteristics, such as how often the medical team reviewed the patients after-hours and on weekends on the wards. Medical discharge paperwork was usually done by the Junior Doctors who had limited training on how to complete the paperwork. The ward doctors' competing priorities and the inefficient use of the hospital bed-cleaning system and discharge lounge seemed to contribute to ICU patient discharge delays.

## Community

The last component in activity theory, *community*, refers to the groups of people who have similar values and beliefs, and who interact and cooperate within everyday practice. The observations revealed that the whole hospital was the *community* where ICU patient discharge took place. It consisted of sub-communities, including ICU, various wards, and hospital bed management department, within which there were community members including different professional groups such as ICU doctors and nurses, ward doctors and ward nurses, and hospital Bed Managers.

*Rules* mediate *subjects* and *community* and influence how the *community* functions as a whole, while *division of labour* determines how the *community* achieves the collective *objective*. This study found that problems with some *rules*, including discharge routines, and issues within *division of labour* contributed to the distrusting relationships, which further influenced discharge process.

First, Capacity Alert as a *rule* was found to contribute to the distrust between hospital bed management team and other hospital staff. The “Capacity Alert” announcement and the actions taken by the hospital management team (walking through wards checking if there was any empty bed) following the announcement were perceived as an indication of distrust from the hospital management towards the doctors and nurses, as the following interview and field note revealed:

> I think the "Capacity Alert" is offensive. Universally people don’t like it. I actually see it as organisational bullying. No one takes any action. In fact I think the exact reverse occurs. If I was a junior staff on the ward and I heard that, I would go even slower, I think a lot of doctors do. Well the implication from that announcement is that you as a group of people [who] are not working hard enough. (Participant # 2, ICU Consultant)

The majority of the interviewed participants thought that the administration did not trust them in discharging patients and vacating hospital beds. They argued that they had already been trying hard enough to discharge patients home. During observation, it was clear that there was tension between the hospital management team and staff when the management team walked past the wards following a Capacity Alert announcement. As the following quotes showed:

> [When the hospital management team were walking past a ward, they were looking into each patient room and checking if there were any empty beds]...very insulting actually. They think we are hiding beds. (Participant # 31, ward Senior Nurse)

Second, routine communication patterns impeded the discharge process. There was limited communication among staff from different departments on how each department and each team made decisions and prioritised. Staff in different positions and departments had different knowledge about the discharge process. Not knowing the rationales of what other staff did seem to be associated with the distrust among some staff. For example, the distrust from some hospital staff towards the hospital bed management team seemed to be associated with the lack of communication and knowledge sharing in the bed management process. This might be related to the fact that the Bed Managers had to prioritise and make decisions on which patient they allocate a particular bed to, without consulting and explaining the decision-making rationale to the ICU and ward Senior Nurses.

Next, how ward doctors carried out their routine work influenced how other community members interacted with them. The ICU discharge criteria were not only subject to patients' clinical conditions; they also depended on the discharge destination characteristics. As this ICU Consultant confirmed,

> [Whether] I'll send a patient after-hours and on the weekends… will depend on if I think they are going to be safe, and that's variable. It varies depending on who's going to look after them on the wards. Well there's only specific small number of [ward] consultants you do it to. Because after a period of time, you know which doctor actually will see their patients [on the weekends and after-hours]. Therefore my decisions of discharging these patients after-hours can vary. (Participant # 2, ICU Consultant)

In contrast to the above, supporting other community members ensured safe patient discharge. As the following interviews revealed:

> The Liaison Nurse role initially is to help with the transition of patients and their relatives going from ICU to the ward. …also helping ward nurses up-skill a bit if the patients have anything special such as a drain the ward nurses hadn't seen for a while…(Participant # 4, ICU Senior Nurse)

> If there are concerns after discharge, especially after-hours… then one of our guys [ICU doctors] will go up and just review the patient and discuss the situation with the treating team. (Participant # 4, ICU Senior Nurse)

Furthermore, in *division of labour*, supporting inexperienced team members was found to optimise the discharge process. The ICU Junior Doctors claimed they had access to the ICU Registrars if they needed support on completing the discharge paperwork. The nurses and ward clerks always checked that the Junior Doctors carried out their tasks correctly and in a timely manner:

> They [the junior doctors] know what they have to do, because the nurses won't let them go without all the forms being written up. (Participant # 2, ICU Consultant)

> The ward secretary advised me to update the discharge summaries regularly and to get on top of them so when a patient is ready to go it all will kind of be ready… (Participant # 82, ICU Intern)

ICU Registrars were often concerned that they could not offer the Residents and Interns enough support due to workload pressures and time constraints, but they stated that they did made an effort to support the junior doctors:

> I try and make sure that the interns are not left alone to do the discharge paper work… (Participant # 83, ICU Registrar)

Finally, in *division of labour*, how individuals influence the discharge process depended on their access to clinical resources. Having access and control of clinical resources such as bed availability, staffing and equipment, seemed to give power to the individuals in higher positions. Some wards had unwritten rules and demands that the ICU staff had to observe and follow in the discharge process. For example, on one of the wards, the nursing staff requested to be notified if the ICU patients had any special care needs such as having a tracheostomy tube in situ, while another ward preferred to put ICU patients into single rooms. ICU nurses had no control of the timing of patient transfer. All these practices prevented ICU nurses from planning patient care and discharge activities.

Since the hospital was seen as the large community that the ICU discharge took place within, the next chapter, which entails the themes emerged from analysing the discharge activity at the organisational level, further reveals how community functioned together.

## Summary

There were many participants in the discharge process. The first group was the discharge decision makers and contributors. ICU Consultants were the decision makers, while ICU Registrars, ICU Senior and Junior Nurses, ward treating doctors, and ward Senior Nurses contributed in the discharge decision-making. The other group comprised the participants, such as ward Junior Nurses, Bed Cleaners, and Wardsmen, who did not have involvement in discharge decision-making but who contributed to the discharge process. The factors that influenced the competency of the participants were the “subject-producing systems”, including staff experience, orientation, and support. More experienced doctors seemed to be more confident and were given more autonomy in the discharge process. The orientation program provided to medical staff in the ICU did not appear to adequately address the ICU discharge process and the needs of different levels of staff.

ICU team members aimed to discharge patients to the ward as soon as possible. They usually gave consideration and negotiated with ward nursing staff on the timing of the discharge. Competing priorities such as the hospital Bed Manager putting outliers into specialty areas and cancelling surgical cases to accommodate patients from the community and emergency departments seemed to be common practice. Accepting ICU patients was only part of the ward nurses’ objective and ICU patient discharge was often not considered a priority.

In the discharge process, there were a number of tools used by the participants. Junior Doctors had limited training about how to complete some of the discharge paperwork, such as the medical discharge summary. The nursing discharge summary lacked clarity and consequently ICU nurses completed the nursing discharge summary differently. Ward forms for taking phone handovers from ICU optimised the information transfer between ICU and wards. The hospital bed management system lacked transparency and accuracy. Lack of reinforcement of computer program use in hospital bed management impeded the discharge process and contributed to communication breakdowns and discharge delays. The length and depth of the ICU morning medical handover varied due to the duty Consultants' preferences. Face-to-face handover from ICU to ward nurses only happened on rare occasions. As a result, ward bedside nurses often received limited information about their patients when they first took over the patients' care on the wards.

Capacity Alert, as an organisational strategy to push the discharge process within the hospital, did not appear to be effective. It may have contributed to the negativity of hospital staff towards the hospital bed management team. ICU discharge guidelines were in place but few ICU participants were aware of their existence. Different discharge criteria were used by different ICU Consultants. ICU doctors routinely reviewed the patients discharged to the wards after-hours by triage to ensure their safety. However, the patients who were discharged to ward after-hours routinely were often not reviewed by any doctors until the next morning.

In *division of labour,* majority of the participants were clear about their roles and responsibilities in the discharge process. Competing priorities of ICU and ward doctors made it difficult to meet the demands of discharging patients smoothly. ICU Senior doctors felt frustrated with the time constraints and unable to train Junior Doctors. Similarly, ward doctors could not complete the patient discharge process, which contributed to discharge delays. Little discharge planning took place in ICU. ICU nurses played a crucial role in pushing the discharge process. Face-to-face handovers were often interrupted due to inappropriately prepared patient rooms. The hospital bed-cleaning system and discharge lounge were not used effectively.

The whole hospital could be considered as the large community within which the ICU patient discharge process took place. It has many sub-communities such as the various departments. Problems within rules and division of labour were found to impede the discharge process.

# CHAPTER SIX

# THE THEMES

## Introduction

The previous chapter described the ICU discharge process using activity theory as an analytical framework. The analytical process associated with the first phase of data analysis underpinned the second phase of data analysis, which focused on the distributed cognitive discharge process at the organisational level. By reviewing the transcripts and reading across the *codes* from the first phase of data analysis under the framework of distributed cognition's dimensions (teamwork, cognitive processes, and artefacts), five themes emerged.

*Hierarchical power and authority* describes how the staff with more power influenced the discharge process and how the staff in lower ranks followed the decisions and personal preferences of staff in higher positions; *Competing priorities* explains the staff members' difficulties in managing demands from their various roles, responsibilities and objectives, and the impact of failing to meet the multiple demands; *Ineffective communication* illustrates the problematic communication among teams and across departments in the discharge process; *Failing to enact organisational processes* reveals the failure or underutilisation of the organisational rules and strategies related to ICU patient discharge; and *Working collaboratively to optimise the discharge process* demonstrates how some teams worked collaboratively and improved the discharge process. The links between activity theory and distributed cognition in relation to each of the themes are shown in Table 10. This chapter provides an in-depth description of the five themes.

Table 10 Relationships among themes, activity theory components, and distributed cognition dimensions

| Theme name | Activity theory components | Distributed cognition dimensions |
|---|---|---|
| Hierarchical power and authority | Subject<br>Rules | Teamwork |
| Competing priorities | Objective<br>Rules<br>Division of labour | Teamwork<br>Cognitive processes |
| Ineffective communication | Objective<br>Tools<br>Rules<br>Community<br>Division of labour | Cognitive processes and artefacts |
| Failing to enact the organisational processes | Subject<br>Tools<br>Rules<br>Community | Cognitive processes and artefacts |
| Working collaboratively to optimise the discharge process | Subject<br>Objective<br>Rules<br>Community<br>Division of labour | Teamwork |

## Hierarchical Power and Authority

The first theme, *Hierarchical power and authority*, explains how preferences and decisions made by staff in higher positions in the organisation were widely accepted and followed by junior staff. This theme started to emerge early in data collection. Observations and informal interviews showed that position hierarchy was the main factor determining the individuals' influence on the discharge process. There are two dimensions within this theme: 1) individuals' positions were associated with their involvement in discharge and their discharge preferences and decisions were often accepted by junior staff; and 2) junior staff rarely spoke up in front of senior staff, both in ICU and on the wards.

First, staff in higher positions seemed to have more power and influence in the discharge process including discharge decision-making and discharge practices. For example, as the following quotes revealed in relation to Consultants and Senior Nurses:

> …the morning medical handover…the consultants…some like it short and brief, some like it to be more in detail…as Registrars we must consider who we are reporting to. (Participant # 3, ICU Registrar)

> …joining the doctors' morning rounds was a waste of my time because I don't have time to hear how their weekend went… (Participant # 31, ward Senior Nurse)

Observations indicated that the ICU Consultants' supervisory authority over the doctors in lower positions seemed to play a role in the way other doctors accepted discharge decisions. One example was that the junior doctors rarely challenged the Consultants' discharge decisions, even though there were variances in discharge decision-making among the ICU consultants:

> I don't ever challenge the consultants' decision to discharge a patient from ICU. (Participant # 34, ICU Registrar)

> …yes, there are variances among the consultants. Say a particular patient, some [ICU Consultants] may discharge the patient while others may like to hang on to the patient for one more day just to make sure the patient is going to be ok…(Participant # 3, ICU Registrar)

Staff in lower positions rarely spoke up in front of senior staff both in ICU and on the wards. ICU Junior Doctors stated that they often received limited information about the patients during some morning medical handovers but did not voice concern about this to ICU Senior Doctors. They often did not have a clear understanding of how discharge decisions were made, but none of the interviewed Junior Doctors tried to seek clarification or queried how the discharge decisions were made during ICU morning rounds. While most ICU nurses claimed they were part of the decision-making team, they often accepted the doctors' decisions without questioning them. During the observation, some ICU Senior Nurses were concerned about some discharge decisions but did not challenge or voice their concerns to the ICU Consultants. This is exemplified in the following case summary:

> After the ICU Senior Nurses' morning handover, I asked an ICU Senior Nurse if she thought a particular patient was going to be discharged. She said, "No, because the patient still needs a lot of care which the wards won't be able to provide". However the ICU Consultant decided to discharge the patient. I queried what she thought about the doctor's decision. She stated, "I don't like to send this patient to the ward. I mean we are not stretched for beds today. I would like to keep her here if possible, because the patient's condition is still not so stable and I would like to keep a close eye on her if we can. But you know the doctors can send the patient to the ward they just may. It doesn't matter what we think." She did not convey this concern to the doctors. (Case one summary)

Similarly, although the ward Junior Doctors encountered difficulties in trying to communicate with nurses when they did not join medical ward rounds, the doctors did not voice their concerns to ward Senior Nurses. As one ward doctor stated,

> well we haven't raised the issue [of nurses not joining the doctors' ward rounds] with them because normally we will come back a bit later after the ward rounds to make sure that things are done. (Participant # 1, ward Resident)

Ward Senior Nurses' decisions on admitting ICU patients were often taken as orders by Junior Nurses. The ward Senior Nurses' decision-making about accepting the ICU patients, including which bed to put the patients into, and which nurse would be looking after the patients, did not involve Junior Nurses at all. There was no process in place for the ward staff to communicate or discuss their concerns or opinions about the ward discharge process.

In summary, this theme revealed that the final decisions were often made by individuals who were in higher positions and had authority over other staff. Their decisions and discharge practices were often accepted by staff in lower positions and junior staff rarely spoke up in front of senior staff.

## Competing Priorities

The theme *Competing priorities* describes how hospital staff tried to fulfil the multiple demands on their time and resources, and the impact of failing to meet these demands on the discharge process. Observations showed that competing priorities had an influence on every step in the discharge process including in ICU, on the wards and during hospital bed management.

ICU doctors often faced competing priorities such as competing demands for ICU resources. The high occupancy rates (97%) of this ICU indicated that the ICU beds were constantly in high demand. Patients from the emergency department, the operating theatre, and the wards were often waiting for ICU beds. This resource constraint forced the discharge decision makers to discharge some patients to the wards earlier than expected on occasions. As one participant put it,

> Yes, we do discharge ICU patients to ward by triage sometimes, but as long as they no longer need full system support… Occasionally I [a consultant] discharged the patients who I would have preferred to keep them in ICU a bit longer when there was a sicker patient waiting for an ICU bed in emergency department. (Participant # 84, ICU Consultant)

To ensure these patients' safety, ICU doctors often visited the patients on the wards after discharge, especially if the discharges occurred after-hours. However, this overstretched the ICU medical cover resources after-hours when less medical staff was rostered in ICU. The after-hours on-duty ICU doctor (usually the on-duty ICU Registrar) often faced pressures of having to visit these patients on the wards as well as look after the critically ill patients in ICU.

During the interviews, most of the Registrars expressed frustration at competing priorities in their role. On one hand, they had to get things done in a timely manner, such as reviewing patients in the morning. On the other hand, they found it difficult to find the time to educate and mentor the Junior Doctors, particularly the Interns, to make sure they understood the tasks to be done and how to do them. As this Registrar stated,

> The Registrar is to teach the interns. I've got to provide a good teaching and learning environment anyway and I've also got to kind of balance make sure that the work's done too. This morning one of the Residents was told to do all the discharge summaries, and they tend to get the Interns to do them, to make sure that the housekeeping like the green sheets and so on are done. (Participant # 3, ICU Senior Registrar)

> I'm often really busy managing patient care and so often I need them [the new Interns and Residents] to start working straight away and it's really hard to take the time to orientate them. I find that quite difficult…I had to orientate them as we went…because we were so busy, they hit the ground running. (Participant # 83, ICU Junior Registrar)

Ward doctors often faced competing priorities in the discharge process and this seemed to be associated with ward discharge delays. Interviews with ward nurses confirmed that ward patients often waited for the ward doctors to come back to write discharge prescriptions and attend follow-up reviews before the patients could be discharged from hospital. It seemed that writing discharge prescriptions and completing discharge tasks were given low priority compared with other tasks. As these ward Senior Nurses said,

> Then one particular team has been in clinic all morning, so we are waiting for that team who have got about ten patients here to review and may discharge a few and do some scripts and sort of follow up the rest of their process. They have got clinic so they can't cancel clinic to sit here and write scripts. It's hard for them. But it's also frustrating for us too … (Participant # 77, ward Senior Nurse, on case 27)

> They [the ward doctors] don't do the discharge paperwork while they do the ward rounds. I guess they're trying to see too many people. (Participant # 65, ward Senior Nurse, on case 19 and 22)

Ward discharge delays often occurred during data collection, which consequently influenced ward bed availability.

Similar to the high demands for ICU beds, the ward beds were often in high demand in this hospital. The regular "Capacity Alert" announcement during data collection period was evidence that the hospital was often at full capacity and many patients were waiting to be admitted from various sources. One particular bed could be needed by a patient from ICU, a patient waiting in emergency department, and a patient coming in from the community for elective surgery. The hospital Bed Managers had to balance the demands from all these sources. But on occasions some hospital bed allocation strategies were not agreed by other hospital staff. Ward staff often had no knowledge of how many patients from different sources needed the hospital beds. This seemed to contribute to the conflicts between hospital staff and the bed management staff, as these interviews showed:

> So there are lots of variables in why there is bed block…sometimes it's to do with the bed manager. She doesn't have the finger on the pulse… the bed manager can sometimes hide beds. She knows she's got people coming in from the community, yet we might have had patients out here in ICU and it has happened that have been sitting here waiting for a bed for a couple of days. The ward are totally unaware of this and so she'll move patients into there or put outliers in there and then I'll go to the ward and I'll go, "Oh you guys are full today". The ward nurses would tell me like, "Oh well we weren't when we have just taken a couple of medical outliers". All of our patients have been sitting down here [in ICU] for two days waiting to get up here. That's not their fault; it's the bed manager's fault. (Participant # 4, ICU Senior Nurse)

Putting non-specialty patients into specialty wards due to the lack of beds in general medical wards was found to be a common practice. General medical patients were at times admitted into specialty areas such as renal or neurosurgical wards. Then when there were patients needing to be admitted into these specialty areas, the Bed Manager often had to put them somewhere else that had a bed. Observation showed that it took considerable amounts of time for the ward doctors to walk around the hospital reviewing their outlier patients. This might consequently impacted on the work efficiency of ward doctors, who could not finish the ward rounds and follow up the discharge paperwork soon enough to vacate the wards beds for the ICU patients. The following participant suggested that the specialty areas should be protected from having outliers:

> In the wards I feel that the specialty areas, the ones that take a large catchments from ICU, should be left alone and leave them with beds unless we have no one to send to them which is pretty rare, so that they can take our patients. (Participant # 4, ICU Senior Nurse)

Ward Senior Nurses faced competing priorities when allocating beds to patients being discharged from ICU. Observations showed that for the ward Senior Nurses, balancing their nursing staff's workload and other patients' needs were just as important as helping ICU to vacate beds. When allocating beds, these ward Senior Nurses' focus was on ensuring that their wards functioned optimally in relation to their staffing levels, staff skill mix, staff workload, their own specialty patients who were on other wards as outliers, and the needs of other patients. As stated by this participant,

> The other considerations are that we have six bed bays. I need to consider the needs of five other patients. If I put a patient with heavy dependencies from intensive care into a six-bed bay, because they are still requiring some need, one nurse can't be everywhere. It is not uncommon for one nurse to have six patients, so if all her time is monopolised by the intensive care patient five other patients will go without care of some degree. (Participant number 31, Ward Senior Nurse, on case 1)

The ICU team's request for a ward bed was often weighted against these factors. Ward senior nurses were in constant negotiations with the hospital Bed Manager over which ICU patients should receive the available beds.

In summary, the hospital staff members' competing priorities in the discharge process influenced the discharge process. Observations and interviews revealed that staff working in different departments had their respective competing priorities. In order to meet the multiple demands of the competing priorities, ICU often overstretched its own medical staff to ensure patient safety after ICU discharge; ward Senior Nurses often had to consider their nursing skill mix and resource availability when allocating beds; and hospital Bed Managers had to allocate beds in a balanced way to meet the demands from various sources. Failing to meet the demands of competing priorities may be associated with the ward discharge delays. The differing level of knowledge of staff about bed allocation in the discharge process may be associated with the misunderstanding and conflict among staff.

## Ineffective Communication

*Ineffective communication* describes the problems associated with the lack of communication between doctors and nurses and among staff from different departments, and the influence the lack of communication had on discharge. The observations, interviews, and collected documents showed that the effectiveness of communication in the discharge process was associated with the tools the staff used, how well they understood the tools and procedures, and how well they communicated within the hospital. There are three dimensions in this theme: 1) information loss in ICU to ward nursing handover; 2) ineffective communication among staff from different departments; and 3) ineffective communication between medical and nursing teams in ICU and on the wards.

The loss of information during the handover process was obvious when the information given by the ICU nurses and the information received by the ward nurses were compared. The lack of documentation for the verbal handovers on the wards, combined with the poor quality of the face-to-face handovers, were the main reasons of the information loss, as the following case summary showed:

> This ICU nurse actually did a phone handover, she handed the patient over to the ward nurse in charge. But this ward nurse in charge did not hand that information over to the nurse who was looking after this patient, because she had already gone home by the time the patient arrived on the wards. (Case 14 summary)

As described in Chapter Five under *tools*, ICU to ward nursing handover had various problems. Ward nurses rarely referred to the nursing discharge summary when patients arrived on the wards. This may be associated with design issues, different understandings of what information should be included in the ICU nursing discharge summaries, and the lack of quality control over time. The differing understanding of the purpose of the phone handovers, together with lack of documentation on some wards during the phone handover and interrupted face-to-face handover, seemed to be the contributing factors to information loss.

In contrast, on a small number of wards, which had standard documentation for receiving ICU nursing handovers, the information was transferred better than the wards without such documentation. The observations showed that the form used by ward staff to document phone handover facilitated the handover not just by documenting the handover information; it also provided the ward nurses a guide, which prompted them to ask questions during handovers.

Ineffective communication among staff from different departments seemed to be a consistent problem across the hospital. This may be associated with the observed conflicts among hospital staff. Staff from various departments did not understand how staff from other departments made decisions. There was no process in place for staff to share their decision-making processes and ask questions with staff from other departments. For example, the Bed Managers often communicated with other bed management team members such as the department directors and Bed Managers from other facilities to source all possible beds for the patients waiting for beds. However, this effort was not seen by other staff who requested ward beds for patients. The reasons ward Senior Nurses assigned ICU patients into single rooms were not explained to nor understood by ICU doctors and nurses. At the same time, ICU nurses were often frustrated with the time wasted waiting for ward beds, nor were they told the reasons for the wait. ICU nurses often complained that they could not plan the patient care for this reason. It also made it difficult for the ICU Senior Nurses to plan staffing, without knowing when the ICU patients would be transferred out of ICU.

Similarly, some changes made in the discharge process by ICU were not understood by ward Senior Nurses. For example, the ICU daily patient update list used to be sent to various departments, including the hospital Bed Managers and some ward NUMs. However the ward NUMs stopped receiving them, yet the reasons for the change was not communicated to ward staff, which may have contributed to the conflict between a small number of ward Senior Nurses and ICU staff.

There seemed to be insufficient communication between medical and nursing teams within departments, both within ICU and on the wards. Nurses and doctors worked alongside each other in each department constantly, yet they did not always communicate effectively and sufficiently. In ICU, nurses did not routinely update the doctors on their patients' discharge progress, through for example information on when the patient would be discharged or if all the tests had been done before discharge. The doctors often had no knowledge if the patients were still in ICU, if they had all the tests ordered in the ward round, or when they were transferred to wards. As described in the previous chapter, there were often a few hours of ICU discharge delay. The patients were rarely reviewed again by ICU doctors after the morning rounds and before being discharged from ICU. ICU bedside nurses seemed to play an important role in this situation because they had to be able to voice any concerns to the doctors if any issues arise for the patients.

On the wards, however, the issues were different. As described in *Hierarchical power and authority*, nurses did not join the doctors during morning ward rounds on a small number of wards. The ward nurses on these wards had to read the patient charts to find out what had to be done before patients were discharged. The interviewed doctors were concerned about whether the ward nurses carried out their orders promptly, but did not raise their concerns with the nurses. As one doctor commented,

> I've written down in the chart plan to do so and so urgently. But if the nurses don't go back and have a look at the plan, they wouldn't know what to do. A lot of time it's a bit hard for us because the consultants are rushing ward rounds and we've got things that need to be done, and we need to tell the nurses and they're not there and I don't have time to go and hunt down one person to tell them what we're doing. (Participant # 1, ward Resident)

In summary, there were various issues associated with communication among teams and across departments. The ICU to ward handover process was problematic, with ambiguous nursing discharge summaries, the purpose of the handover understood differently, and poor quality face-to-face handover due to interruptions. How staff in each department made discharge decisions was not understood by staff from other department due to lack of communication. There was lack of communication among ICU nurses and doctors once discharge decisions were made. Further patient reviews relied on ICU nurses raising concerns to the doctors, and this could be a challenge for novice ICU nurses. Finally, when doctors and nurses did not do morning ward rounds together, they could not communicate information in a timely manner.

## Failing to Enact the Organisational Processes

The theme, *Failing to enact the organisational processes*, explains how the staff members' ineffective use of established organisational processes and strategies influenced the ICU patient discharge. Guidelines, protocols, and processes to optimise the discharge process were not routinely followed, and some strategies that aimed to improve discharge processes failed to produce desired outcome. There are four dimensions in this theme: 1) inefficient use of bed management systems; 2) lack of awareness of written ICU discharge guidelines; 3) failure of 'Capacity Alert"; and 4) not using support systems effectively.

First, the current patient data and bed management computer programs on the hospital network were not utilised appropriately for bed management purpose. As shown in Chapter Five in Table 8, physical and digital hospital bed management tools were not used effectively. Because ward staff often did not enter patient discharge information into the computer system, the hospital Bed Managers had to physically walk around the hospital and talk to Senior Nurses to determine where empty beds existed. Bed availability information largely depended on the hospital Bed Managers manually collecting and relaying information from and to hospital staff in different departments. Most of the time, bed availability and allocation information was only available from the on-duty hospital Bed Manager who often wrote bed availability on the daily patient information printout they held in their hands. This manual management process was observed to have disadvantages. It was inefficient and non-transparent, and in some cases contributed to discharge delays and communication breakdowns.

Second, as described in Chapter Five under *rules*, the majority of the ICU medical staff members were not aware of the discharge guidelines, and/or did not refer to them in practice. Most of the Registrars and other junior doctors did not think referring to the guidelines was important because the Consultant did not show them the guidelines. As this interview revealed,

> …if they [the ICU Consultants] expect me to follow it [the discharge guidelines] then they should tell me. If they don't expect me to know and learn it then there's no point in showing me. It depends on their expectation. I'm happy to do what I'm told. (Participant # 82, ICU Intern)

A few of ICU Registrars referred to the discharge guidelines at times, but because the guidelines did not consider organisational factors, the guidelines did not influence their discharge decisions. As stated by this participant,

> The discharge decisions are not just purely protocol and guideline driven, and a lot of it is just your own clinical opinion. When you're looking at the patient and see how they're progressing. I suppose if you wanted to you could sort of rationalise it into, "this patient is now 25 hours post extubation we can boot them out". But it's not always that clear and depending on bed pressures and everything else, that all factors in too. (Participant # 3, ICU Registrar)

Third, as described in Chapter Five under *rules*, Capacity Alert announcements appeared to have made minimal improvement on bed availability within the hospital. This might be because of one of the following reasons: a) it was non-productive. Because staff felt they had already tried hard enough to discharge patients, and the announcement of Capacity Alert would not make any difference; b) the outcome of the announcement was not communicated so hospital staff did not see the benefit of using this strategy; and c) lack of input from ward level staff during the decision-making process to announce it. Because of this, the announcement sometimes did not reflect the true bed availability status, as this participant confirmed:

> No one contacted this ward [before the announcement of Capacity Alert]. This ward has one spare bed. (Participant # 31, Ward Senior Nurse)

However, there was another message that was not communicated clearly in Capacity Alert announcements. In the action cards for Capacity Alert, the first action was to expedite discharges. The action cards was not seen in the ward areas observed, and consequently, ward staff perceived the purpose of Capacity Alert was to reinforce ward discharge decision making, not focusing on the ward discharge process. Yet there were occasions when patients were waiting for the doctor to complete the discharge paperwork and prescriptions, which contributed to discharge delays according to ward nursing staff.

Finally, a few resources that were put in place to improve bed flow were generally not used by ward staff. As described in Chapter Five under *division of labour*, the priority bed cleaning services and discharge lounge was put in place to facilitate and optimise service delivery within the hospital. However, there were many occasions when ICU patients waited for the ward beds to be cleaned. Ward nurses could contact the hospital bed cleaning supervisor to put in an urgent request, but it was rarely used. As stated by this ICU nurse,

> I was just told that they were putting the sheets on the bed! I said well hang on a moment because it's been two and three quarter hours and I've been told simply it was a bed shuffling exercise. But then it became a bed cleaning exercise – they were waiting for the bed to be cleaned. (Participant # 11, ICU Junior Nurse)

When asked why they did not use the service to clean the beds urgently so the ICU patients could be discharged earlier, ward nurses claimed that they did not know ICU needed to discharge those patients urgently. In contrast, ICU nurses stated that there were often patients waiting for the ICU beds. The sooner they discharged the patients to the wards, the quicker they could admit patients waiting for ICU beds.

Similarly, the discharge lounge was not used effectively. The discharge lounge was put in place to free up wards beds as soon as possible. Ward patients often waited for discharge prescriptions and transport before they went home. According to the hospital Bed Managers, these patients could be transferred to the discharge lounge to wait so the ward beds could be made available for other patients. However, this was not utilised fully on many occasions when Capacity Alert was announced during data collection. On examination, there were a few barriers that prevented this facility from being utilised efficiently. Some ward staff claimed that the discharge lounge did not have Registered Nurses present, and therefore it was not safe to send their patients there to wait before they go home. As the following field note revealed,

> There were patients on the wards waiting for discharge prescription. And ICU patients were waiting for those beds. But this transit lounge was fairly empty today. (Field note taken on 27 August, 2007)

Another reason was that the discharge lounge was not equipped with necessary facilities to accommodate some patients' needs. For example, some patients needed to sit up with their legs elevated and could not sit in a normal chair. But the discharge lounge only had normal chairs and limited number of very old beds on which the head/end of the beds could not be elevated.

In summary, the hospital bed management systems failed to communicate bed availability information in a timely manner. There were written discharge guidelines in the ICU but they were not known or referred to by staff and their usefulness was doubted by some medical staff. Capacity Alert, special procedures of requesting beds to be cleaned urgently, and the discharge lounge were all aimed at improving the discharge process and patient flow. However, these measures did not work as expected in practice. Capacity Alert achieved minimal effect to improve patient flow, and its process was not communicated effectively within the hospital. Hospital staff members' understandings and actions varied in relation to what to do and how to use the discharge lounge and the priority bed cleaning system.

## Working Collaboratively to Optimise the Discharge Process

The theme, *Working collaboratively to optimise the discharge process,* describes how some staff members looked beyond their own team or departmental boundaries and worked in a coordinated way with others in order to achieve better patient outcomes and improve patient flow. There are four dimensions within this theme: 1) Working beyond team and departmental boundaries to optimise discharge; 2) Pushing the discharge process forward; 3) Nurses safeguarding the discharge process; and 4) Supporting inexperienced team members.

Some of the teams had strategies in place to communicate and collaborate among teams and across departments. ICU doctors often visited patients on the wards when the patients were discharged after-hours, as stated by this ICU nurse:

> I would speak to the Registrar that's on the ward personally. And I would say "this patient is coming to the ward, we would have liked to hang on to them for another six hours or so but we do need the bed so you know you need to take their bloods at twelve o'clock" or just give very clear instructions for the handover, and then I would go up and see the patient say a couple of hours after their discharge, and see how they're doing. (Participant # 83, ICU Registrar)

In addition, on some wards, nursing and medical teams worked in a coordinated way to forward plan their patients' care. For example, on ward C, which consisted of two sub-specialties C1 and C2, doctors and Senior Nurses from both specialties held regular meetings to discuss bed demands and patient management plans. Because the doctors often reviewed their patients regularly when the patients were in ICU, they could predict when the patients may return to their wards and this prediction was communicated back to the nursing team at these meetings. As stated by the following ward nurse,

> We have a meeting here in the ward Monday and Fridays with the specialists. We have three of them now and myself and sometimes the nurse unit manager of the [another specialty which they share some of the beds with] units. …we talk about our in-patients and if we're aware of someone in the ICU, when those patients might come back. So we do talk among ourselves as a network trouble-shooting strategy to discuss any particular clients so obviously smooth things out a bit. (Participant # 43, ward Senior Nurse)

The Senior Nurses then organised staffing and pre-allocated beds accordingly. Therefore on this ward, forward planning was in place to ensure a smooth transition for their patients' return from ICU. Observation showed that there were fewer issues when ICU patients returned to this ward.

Furthermore, some teams pushed the discharge process forward. The hospital Bed Managers often faced competing demands for beds and ICU patients were not always given priority. But when ICU patients' needs were given priority, the Bed Managers worked closely with the ward Senior Nurses to allocate the ICU patients beds. The Bed Managers often negotiated with ward staff and suggested to them how to rearrange beds to accommodate patients from ICU.

ICU nurses also pushed the discharge process forward. ICU Senior Nurses often checked with the Bed Manager about bed availability. Once a bed was allocated on the wards, the ICU bedside nurses often initiated the communication with ward nurses and regularly checked with the ward staff regarding the timing of patient transfer. The observation showed that these pushing strategies did prevent discharge delays for some cases, even though ward staff often felt pestered when ICU staff made repeated queries. As stated by this ICU Junior Nurse,

> After I was told there was a bed on ward A, I rang immediately to find out what sort of time frame they would be ready so that I could accommodate them, find out how I could just get my paper work finally in order and get the patient prepared to go to the ward…(Participant # 11, ICU Junior Nurse on case 17)

The ICU Liaison Nurse communicated with ward nurses and helped them to solve issues that prevented the patients from being transferred to the wards. This meant that some discharges occurred sooner. As this participants verified,

> The Liaison Nurse sometimes get the staff up there: “Well why don’t you come down and have a look just lay your eyes on this patient and as see what you think”, and some of the nursing staff the nurse unit managers will come down. (Participant # 4, ICU Senior Nurse)

ICU nurses had a strong focus on utilising ward beds, therefore on occasions patients were sent to the wards late at night. As stated by this ICU Senior Nurse,

> Researcher: Is there a time limit that you’re going to say we’re not going to discharge this patient today because it is too late, we’ll wait for tomorrow?
>
> ICU nurse: No there’s no time limit. If a bed became available in the middle of the night, and the patient were booked for discharge then we should utilise that definitely. It doesn’t happen very often. (Participant # 44, ICU Senior Nurse)

However, while the efforts of the ICU nurses and hospital Bed Managers did improve the patient discharge, some ward staff felt they were being pushed to admit the ICU patients:

> There is pressure; there is always pressure from the Bed Manager. I have had to field phone calls from intensive care saying, "well if you don't take this patient we're going to have to cancel theatre". Especially after-hours too when we have to re-shuffle the beds to accept ICU patients, which makes it harder because you've got less staff again. (Participant # 31, case 1)

ICU nurses communicated with ICU doctors and other teams, and ensured important information was communicated among teams. As this field note showed,

> And then the Registrar was finishing off his progress notes, he wrote "consult ENT to ward". The nurse in charge said "you should have written 'ENT happy for patient to go to the ward' because they have seen the patient this morning, they were happy for the patient to go to the ward so you don't have to talk to them again because they said so in the notes this morning". (Field note taken on 24 April, 2007)

Finally, supporting inexperienced team members seemed to optimise the discharge process. ICU nurses gave junior doctors support, showed them what needed to be done, checked and followed up with them; senior nursing staff supported junior nursing staff in the discharge process; and the ICU ward clerks helped new doctors to complete discharge paperwork. These actions ensured the patients were prepared for timely discharge.

This ICU regularly had new doctors rotating through the unit and new nurses starting. From observation, there was a general culture of supporting new staff. Examination of nursing education plans, documents, and clinical competency assessment routines revealed that the ICU nursing education seemed to be well structured and the new ICU nurses were well supported by senior nursing staff and the nursing educators. The majority of the ICU nurses were permanent staff in this unit, and therefore the nurses tended to know the processes and protocols better than the doctors who only spend a few weeks in the unit.

Interviews with ICU senior doctors revealed that they were aware that the ICU nurses helped the new junior doctors with the discharge paperwork in the discharge processes. ICU junior doctors, especially the Interns, often felt intimidated by the ICU nurses when they first start working in ICU. Interestingly, when asked what they would do if they didn't know how to do the discharge paper work, they often responded,

> The nurses tell us what to do [in regards to the discharge paperwork]. And I came from emergency and up here I don't know how to discharge a patient or what the right procedure is. (Participant # 28, ICU Intern)

When a new ICU Registrar was on duty, experienced ICU nurses often contributed to help the new doctors to become aware of the work processes and patient management protocols in ICU. As this field note documented,

> During ICU ward rounds, the ICU Senior Registrar wrote "to leave IV cannula" in the progress notes. The ICU Senior Nurse said "it is not your job to plan to leave the IV cannula in or not. It's our job. We decide that before the patient goes to the ward". (Field note taken on 24 April, 2007)

On occasions when some ward staff claimed they could not accept the ICU patients because they did not have skilled nurses to take care of them, the ICU liaison nurse provided ward nurses with support and in-service training to up-skill them. As verified by this ICU nurse,

> They’ll just get the handover [from ICU] and they go “wow you know our skill mix is this…we can’t accept this patient”. So the ICU Liaison Nurse would go up and talk them through it a little bit if they’ve got any bits and pieces that maybe they haven’t seen for a while, whether it be treatment regimes, devices, or whatever… (Participant # 4, ICU Senior Nurse)

In summary, ICU doctors and nurses often visited patients after ICU discharge, especially after-hours, to ensure patient safety after discharge. Doctors and nurses on some wards held regular meetings to communicate resource demands and trouble shoot which ensured the staff’s situational awareness. ICU nurses initiated communications and followed up discharge process which pushed the discharge process forward. At the same time, ICU nurses played a vital role in team communication. Finally, the staff who had more knowledge about the discharge process supported the new and novice staff and provided guidance when needed to ensure a smoother discharge.

## Summary

The five themes of *Hierarchical power and authority, Competing priorities*, *Ineffective communicating, Failing to enact the organisational processes*, and *Working collaboratively to optimise the discharge process*, described teamwork, communication, and the artefacts used in the discharge process.

Staff in positions of authority had a strong influence to the discharge process. These staff members’ personal preference decisions on discharge were accepted by staff in lower positions. Staff in different departments struggled to meet the demands of competing priorities, with many of them focusing on their own departments’ priorities. This, in combination with the competing priorities in ICU discharge, ward bed allocation, and ineffective communication among teams and departments, may have contributed to the conflict and misunderstanding among team members and across departments. At the same time, many organisational strategies that aimed to optimise discharge did not function as expected due to lack of response from staff and ineffective communication among team members. Finally, the collaborative work between some teams and departments optimised the discharge process by improving communication, providing outreach services, and supporting inexperienced team members.

# CHAPTER SEVEN

# DISCUSSION AND CONCLUSION

## Introduction

Various aspects of the ICU patient discharge process have been the focus of research in recent years; however, the process as a whole has not been previously explored. This qualitative study aimed to explore the processes involved in the discharge of patients from ICU to the wards, its contributing factors, and to identify areas of potential improvement in resource utilisation and patient safety. Specifically, it aimed to discover how the discharge decisions were made, how knowledge and information were transferred and shared among the participants, how each participant influenced the teamwork, and how the tools used by different participants at different locations impacted on the discharge process. Chapter Five described the findings of the first phase of data analysis which detailed the discharge activities under the framework of activity theory. Chapter Six described the findings of the second phase of data analysis, the five themes that emerged from analysing the activity systems and its components under the distributed cognition framework.

In this chapter, the findings of this research are discussed with reference to distributed cognition, activity theory, and relevant literature. Implications of this research for critical care clinical practice, research, and education are explored and recommendations made. The methodological contribution of using activity theory, distributed cognition, and cognitive ethnography in healthcare research is explored. In addition, the limitations of this research are discussed, and conclusions are drawn.

In the distributed cognition framework, the unit of analysis is the cognitive activity system, which consists of three dimensions: cognition is distributed among a collection of individuals, the relationships among the individuals (teamwork), and the artefacts with which they interact (artefact and cognitive processes) (Hutchins, 1995a). In this study, cognition is distributed among the individuals, including ICU doctors and nurses, ward doctors and nurses, ward clerks, hospital bed management staff, and support teams such as wardsmen and bed cleaners; together the various teams work towards their common goals. The artefacts refer to the tools used in the discharge process such as discharge summaries, organisational strategies such as Capacity Alert, and resources. As shown in Table 10 in Chapter Six, each of the five themes was related to one or more of these elements. Therefore this discussion is made under the following headings: 1) cognition is distributed in the ICU discharge process; 2) teamwork; and 3) artefacts.

## Cognition is Distributed in the ICU Discharge Process

One dimension of distributed cognition is that this framework examines the broader cognitive processes in the system rather than the traditional view of cognition, which focuses on the individual level. It emphasises the fact that cognitive processes are distributed among team members in a group (Hollan, et al., 2000; Hutchins, 1995a). In a distributed cognitive system, optimal individual and team situational awareness is essential for team members to work effectively towards shared goals (Flin, et al., 2008). In this research, two themes that have common issues in relation to this viewpoint are discussed: *Competing priorities* and *Ineffective communication*.

The ICU patient discharge process is a distributed cognitive process. As discussed by Hutchins (1995a) in *Cognition in the wild*, each crew member carried out different tasks but together they navigated a ship successfully. The crew team members not only needed to understand exactly what they were expected to do, but also needed to modify their actions constantly according to updated information from the whole team in the process. This explained precisely what distributed cognition is about – the shared awareness of what is to be achieved collectively in large organisations and how to take action to realise the goals. The findings of this research support the contention that the ICU patient discharge process was a complex distributed cognitive process that involved many individuals in multidisciplinary teams including doctors, nurses, hospital managers, and clerical and support workers from various departments. The patient discharge cognitive process was distributed among team members because each team member needed to make decisions and carry out their activities according to their understanding of the discharge process, the rules related to discharge, and their roles and responsibilities in the process. No single staff member could achieve the discharge objective without other staff members' input.

Situational awareness among team members must be optimised so that the individuals who were involved in the discharge process could make appropriate decisions and take actions accordingly. Large hospitals are dynamic work systems that are constantly changing. To fulfil his or her roles and responsibilities in such dynamic systems, each team member needed to constantly collect information from the discharge environment that was relevant to their objective and assess the situation accurately using available information. This accurate assessment helps the team members to make appropriate decisions. Understandably, each team member's awareness of what was happening in their immediate environment as well as of the whole discharge process was crucial for all members to achieve the collective objective. This process of collecting and comprehending the dynamic information related to their work situation has been referred to as situational awareness (Flin, et al., 2008). Situational awareness is often considered the first stage of decision-making, and is commonly defined as an individual's cognitive process of awareness and understanding of the dynamic information relevant to their task and working environment (Endsley, 1995; Flin, et al., 2008; Wright & Endsley, 2008). There are three essential levels of situational awareness: collecting information (perception), interpreting information (comprehension), and predicting future states (Endsley, 1995). Thus, situational awareness enables team members to make decisions based on the needs of the dynamic work system.

Shared situational awareness among team members is important for optimal team outcome. Wright and Endsley (2008) suggest that within a team, each member has his or her own unique situational awareness (called complementary situational awareness) that is crucial to their sub-goals and individual performance. Their sub-goals must overlap with the team's goal so the team could collectively achieve the desired outcome. Thus all the team members will also need to have a level of shared situational awareness (in which the members' understandings of their work environment overlap) among them to inform effective team decision-making and teamwork and to link their actions and decisions together. In this study, ineffective communication and competing priorities seem to contribute to the lack of shared situational awareness in the discharge process.

First, ineffective communication may be a contributor to the lack of shared situational awareness among participants in this research. Wright and Endsley (2008) identify that team situational awareness can be compromised when vital information is not passed, or not passed clearly, between team members. This may impact on the forward planning for patient care (Flin, et al., 2008). Because there was no regular communication across departments, the decisions made by the Bed Managers and ward nurses on bed allocation were not fully understood by others. In addition, the ineffective interdisciplinary communication among doctors and nurses within some departments (not doing ward rounds together) and among staff across some departments (how urgently the ICU needed the ward beds for their patients), may have contributed to the suboptimal shared situational awareness among team members. Consequently, decisions made and actions taken based on the suboptimal shared situational awareness may have contributed to the inefficiency of the ward discharge process and escalated the bed block situation within the hospital.

Second, staff members' competing priorities seemed to contribute to the level of shared situational awareness among the multidisciplinary teams. The theme *Competing priorities* described how staff members from different departments often had different objectives due to their competing priorities. Decisions were often made according to competing rather than shared objectives and priorities. This could influence the discharge process because team situational awareness may be affected when team members have conflicting goals or knowledge, and it may influence how well team members across departments linked each other's objectives and actions concisely (Flin, et al., 2008; Wright & Endsley, 2008).

Third, the suboptimal level of situational awareness in this discharge process may be associated with the lack of cognitive aids, or the ineffective use of cognitive artefacts in communicating discharge information. Whiteboards and daily goals forms can be effective tools to improve staff members' situational awareness and further optimise clinical communication (Chaboyer, Wallen, Wallis, & McMurray, 2009; Pronovost, et al., 2003; Wong, Caesar, Bandali, Agnew, & Abrams, 2009). This research found that bed management tools did not provide real-time bed availability information, and that other artefacts such as the nursing discharge summary and Capacity Alert were used ineffectively. These could all contribute to the lack of shared situational awareness, which in turn, may impede the discharge process and reduce efficiency.

Interruptions may influence situational awareness among team members (Flin, et al., 2008; G. Miller, 1956). In this research, constant interruptions were an issue experienced by the ICU and ward nurses during ICU to ward nursing face-to-face handovers after the patients arrived on the wards. The association between interruptions and non-technical skills such as situational awareness and patient safety has recently been examined by several groups of researchers (Alvarez & Coiera, 2006; Redding & Robinson, 2009; Westbrook, Woods, Rob, Dunsmuir, & Day, 2010). Many researchers have found that interruptions mid-task were a common occurrence in nurses' work (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2005). Further, interruptions were found to be associated with increased nursing clinical errors, including procedural and medication errors (Westbrook, et al., 2010). Thus the interruptions during the face-to-face handover may have patient safety as well as discharge delay implications.

Interruptions may have an impact on nurses' memory during handover. Working memory, originally called short-term memory in psychology, is part of the information processing function of the human brain. It has very small storage capacity and information can be easily lost from memory if the person's thoughts are interrupted or distracted (G. Miller, 1956). Situational awareness is highly dependent on working memory and interruptions could affect all three levels of situational awareness. For example, interruptions could affect one's ability to gather information (perception), retrieve information in decision-making (comprehension) and predict future events (prediction) (Flin, et al., 2008). In this research, the interruptions experienced by the ICU and ward nurses during the nursing handover – for example, patients asking for water and attending other patients' needs – could have potentially affected the ward nurses' working memory of receiving handovers and gathering information for the new ICU patients. This may further influence the ward nurses' prediction of future events. At the same time, it may interrupt the ICU nurses' process of giving a complete handover. This explains why ward nurses often could not recall much of the information after the interrupted face-to-face handovers in this study.

Further, the interruptions may impact on the quality of the handovers, which may have patient safety implications. Key principles in clinical handover (New South Wales Health, 2009) suggest that clinical communication should be a two-way process, during which the information giver provides information, and the receiver has the opportunity to ask questions while they are acquiring and comprehending information. Interruptions may impair ward nurses' comprehension of the information being given, which further impacts on their ability to ask questions. Poor quality clinical handover can contribute to staff dissatisfaction (Whittaker & Ball, 2000) and increased adverse events in hospitals (Jagsi et al., 2005; Peterson, 1994; Sabir, Yentis, & Holdcroft, 2006). In fact, in other settings, such as aviation (Endsley, 1995) and oil production (O'Dea & Flin, 1998), poor situational awareness has been linked to accidents associated with human errors. Thus, poor quality handover may contribute to serious adverse events if ward nurses do not fully understand the information being given, or cannot recall patient information in an accurate and timely fashion in emergency situations after ICU discharge.

In summary, a lack of situational awareness and suboptimal team situational awareness associated with ineffective communication and competing priorities in the discharge process may contribute to poor teamwork and serious adverse events on the wards post ICU discharge. The next section discusses the findings in relation to teamwork in the discharge process.

## Teamwork

Another dimension of distributed cognition is teamwork, which emphasises that individuals need to interact with each other in the cognitive system in order to achieve the collective objective (Hollan, et al., 2000; Hutchins, et al., 2001). How team members interact with each other in the distributed cognitive process may influence the success of the team, and each team's actions influences the whole system's success (Hutchins, 1995a). Theoretical and empirical literature suggests that leadership, team structure, communication and coordination influence team performance in large healthcare organisations (Flin, et al., 2008; Lin, et al., 2009; Oandasan, et al., 2006; Pronovost, et al., 1999; Salas & Cannon-Bowers, 2000; Vincent, et al., 1998; Xyrichis & Lowton, 2008). Therefore, in this section, the discussion focuses on: team leadership and structure, communication, and coordination. Three themes about teamwork are discussed: *Hierarchical power and authority; Ineffective communication;* and *Working collaboratively to optimise discharge.*

## Team leadership and structure

The theme *Hierarchical power and authority* described the hierarchical order within teams that influenced all aspects of teamwork in the discharge process, including decision-making, team communication, and coordination. The results of this study support the findings of other studies which suggested that healthcare organisations are often hierarchical, with staff in senior positions, especially senior doctors, often having higher status and more power than all other staff (Brand, 2006; Islam & Zyphur, 2005; Reader, et al., 2007). Hierarchical authority can be beneficial for an organisation when leadership is respected, but it can be disadvantageous if its influence on teamwork is too great.

This research found that the hierarchical order appeared to be beneficial for leadership in local discharge activity. A team leader is defined as the person who is appointed to direct and coordinate team activities in the group (Flin, et al., 2008). Team leaders often hold higher positions in hierarchical organisational structure, and have more authority than other team members. Leadership refers to how the leader of a team coordinates and directs team activities, adopting strategies to build effective teams, developing knowledge within the team, and monitoring and assessing team performance (Salas, Burke, & Stagl, 2004). In this study, the hierarchical order and authority were respected within teams across departments in the discharge process. Participants in lower positions were clear about who their leaders were and who should be the final decision makers within their teams. When leadership is accepted, the team stays united to achieve the shared goals (Manion, Lorimer, & Leander, 1996). Thus the discharge process may be carried out smoothly when decisions were clearly accepted and followed by other team members.

The respect for leadership by team members in the discharge process in this study may be because of the effective team leading skills, knowledge and attitudes the team leaders had. However, it appeared that, to some extent, this respect was under the influence of the hierarchical order. The hierarchical order could adversely impact on team performance if the influence of position hierarchy is too great, especially when a single person is given too much power in voicing opinions and decision-making, and the lower ranked members are reluctant to disagree or to voice a different viewpoint (Manion, et al., 1996). In this study, ward Junior Doctors did not speak up when they disagreed with the decisions made by some senior staff to omit multidisciplinary morning rounds. In addition, the morning handover lacked consistency because the reporting Registrars were concerned about the ICU Consultants' preferences on the length of the morning handovers. These issues could have an impact on the discharge efficiency and patient safety if vital information is not shared in a timely manner.

Leadership, team member status, and the norms and rules within teams are considered elements of team structure, and team structure further impacts on team communication and coordination (Flin, et al., 2008). In this research setting, there was a culture of senior ICU staff supporting others in the ICU and on the wards. ICU Registrars often visited patients after ICU discharge when patients were discharged to the wards after-hours earlier than usual; ICU nurses often supported Junior Doctors by advising them about discharge documentation; and the ICU Liaison Nurse provided educational support to ward nurses when the patients had complex needs. The ICU outreach service (visiting patients on the wards after ICU discharge) was found to improve patient outcomes (C. Ball, et al., 2003; Priestley, et al., 2004). Williams and Leslie (2004) found that ward nurses' skill mix was associated with discharge delays.

As reported by Chaboyer et al. (2005), an ICU liaison nurse could empower ward nurses by assisting them to develop the knowledge and decision-making skills needed to provide care to patients with complex needs. It has been suggested that the culture of supporting others, as an element of team structure, influences team communication and coordination, which is essential for effective teamwork and optimal teamwork performance (Flin, et al., 2008). The culture of supporting others may be patient focused, or maybe team focused. Regardless of the reasons, in this research, the culture of supporting others contributed to better coordinated teamwork and therefore may contributed to better patient outcomes.

**Communication**

Numerous studies suggest that team communication problems in clinical practice is a factor that may contribute to adverse events (Pronovost, et al., 2002; Vincent, et al., 1998). This research found that position hierarchy, as an element of team structure, influenced team communication. At the same time, communication between medical and nursing staff members during the discharge process seemed to be inadequate at times. The theme *Ineffective communication* described how suboptimal communication influenced the discharge process.

First, this research found that the hierarchical order in the discharge process influenced the way team members communicated within teams. Junior staff members were often reluctant to speak up in front of the staff in higher positions in the discharge process. This supports the findings of many teamwork studies (Brand, 2006; Edmondson, 2003; Islam & Zyphur, 2005; Mills, et al., 2008). In a simulated business group study, Islam and Zyphur (2005) found that group members in positions of higher status raised their concerns more often than the members in positions of lower status. Another study found that in a operating room setting, staff such as nurses and anaesthesiologists were less likely to speak up in front of the surgeons, and felt unable to speak up when they identified potential patient safety risks in the operating room as a result of them having a lower status than the surgeons (Edmondson, 2003). Brand (2006) argues that not speaking up in front of senior staff may be a strategy that lower status staff use to avoid conflicts with senior staff. In this study, Senior Doctors' preferences such as the length of morning medical handover, were accepted and observed by junior staff. When Junior Doctors did not understand how the discharge decisions were made, and some nurses had different opinions about the discharge decisions, none of these staff members in lower positions raised their questions or concerns with the senior staff. The failure of junior staff members to voice concerns to senior staff may impair clear clinical communication, which may have patient safety implications. Adverse events may occur post ICU discharge when staff members fail to notify other team members of their concerns and are afraid of speaking up in front of senior staff in the discharge process.

Second, this research found that position hierarchy may impair clinical communication openness. Team member hierarchy was considered a factor affecting effective team communication (Reader, et al., 2007; Thomas, et al., 2003). Brand (2006) found that in an adult HDU setting, nurses often played a submissive role in the doctor-nurse relationship. In relation to the openness of the communication between doctors and nurses, Reader et al. (2007) found that most of the senior doctors (80%) felt positive about interdisciplinary communication, compared with 37% of nurses; the majority of the nurses felt communication with senior doctors was not as open and easy as was needed. ICU nurses are at the patients' bedside more often than other healthcare professionals, and they are often considered ICU patients' advocates

(Australian College of Critical Care Nurses, 2002) and a safety mechanism in preventing errors (Henneman et al., 2010; McBride-Henry & Foureur, 2006). In this study, although most of the doctors and nurses claimed that nurses were part of the discharge decision-making team, observation showed that ICU nurses, especially Junior Nurses played a passive role in discharge decision making and often did not voice their concerns to the Senior Doctors when they held different opinions on discharge decisions. Research studies show that leadership is essential to create a safe and open atmosphere in clinical communication (Leonard, et al., 2004; Reader, et al., 2007). It has been found that the majority (94%) of ICU staff would like a reduced hierarchical team and more open communication within their units (Sexton, Thomas, & Helmreich, 2000). In this study, the hierarchical order within team members did not appear to offer staff members the opportunity to openly discuss issues in the discharge process, and senior staff did not openly encourage junior staff to contribute to discharge decision-making. This may have prevented junior staff members from speaking up when they identify issues that may lead to preventable adverse events.

Besides the hierarchical order influences, the frequency of communication between doctors and nurses appeared to be inadequate at times in the discharge process. Studies have found a lack of interdisciplinary communication among doctors and nurses in clinical settings (Alvarez & Coiera, 2006; Donchin, et al., 1995; Nadzam, 2009). The frequency of communication has been identified as a barrier for teamwork between doctors and nurses (Nadzam, 2009; The Joint Commission, 2007), and inadequate communication between ICU doctors and nurses was associated with increased errors (Donchin, et al., 1995). In contrast, a multidisciplinary ward round in ICU was found to reduce patient ICU and hospital LOS (Jain, et al., 2006). In this research, the lack of communication between ICU nurses and doctors after the ICU discharge decision was made, and between some ward doctors and nurses as they did not undertake ward rounds together, could pose a potential risk to patient safety, or reduce the efficiency of hospital resources if either party was not aware of changes in patients' clinical condition or vital information was not communicated promptly.

In addition, this research found that there were variations in the amount of information transferred during the ICU medical morning handover, and information was lost during the ICU to ward nursing handovers. These issues may be related to the lack of handover structure, lack of a standardised minimum handover dataset, and lack of a handover protocol. McFetridge et al. (2007) found that the clinical handovers between emergency department and ICU nurses lacked standardised structure and suggested that a structured approach would improve the handover quality. Häggström et al. (2009) found that during the ICU to ward nursing handover, ICU nurses often did not give sufficient information to ward nurses. Furthermore, Baron and Byrne (2004) argue that face-to-face handovers should be encouraged because it offers the full range of communication channels available, including facial expression and gesture, which help the handover participant to make sense of the information being transferred. Consistent with this perspective, other commentators recommend that face-to-face handover is better than mediated handovers such as phone calls and email (McFetridge, et al., 2007; New South Wales Health, 2009). The handover environment, the social setting, and the language used have been identified as barriers to effective patient handovers (Solet, et al., 2005). Research suggests that poor handover has implications for patient outcomes. Singh et al. (2007) found that poor handovers between hospital trainees and other medical and nursing staff contributed to 34% of medical errors. Observations and interviews in this research indicated that there was a lack of standard protocol and structure in both medical and nursing clinical handovers, and face-to-face handover was underutilised in ICU to ward nursing handovers. These factors together may influence the quality of the clinical handovers, leading to patient safety concerns if ward nurses could not recall vital patient information in emergency situations during the transitional period.

There has been a growing recognition of the need to underpin handover with key clinical communication principles (New South Wales Health, 2009). The following key clinical communication principles are recommended by leading Australian patient safety organisations: leaders' understanding and participation; making handover a priority; ensuring relevant parties are present at the handover; handing over at an appropriate time and a place that is free of distractions and interruptions; standardising handover process; and evaluating handover process and quality regularly (Australian Commission on Safety and Quality in Health Care, 2010; Australian Resource Centre for Healthcare Innovations, 2009). The findings of this research suggested that the current clinical handover process did not follow some of these key principles, including making face-to-face handover a priority, handing over at a place that is free of distractions and interruptions, and standardising handover content.

**Coordination**

In contrast to the problems and issues in the discharge process discussed above, the theme *Working collaboratively to optimise the discharge process* described how effective communication and coordination within and across departments optimised the discharge process. Flin et al. (2008) indicate that team coordination can influence team performance. Team coordination can be improved by strategies such as effective communication, and observing other team members' workload and performance. In this research, staff members adopted some of these strategies which might have enhanced the discharge process.

Regular meetings among nurses and doctors on some specialty wards enabled them to communicate effectively to coordinate their activities and plan for admitting the ICU patients into their wards. When patients were discharged to these wards, it was evident that the process was much smoother than in the wards that did not hold these meetings. This supports the findings of Shortell et al. (1994) that coordinated teamwork and open communication among team members were the major factors contributing to better patient care. Similarly, Jain et al. (2006) found that daily flow meetings attended by all unit managers supported better coordinated care, which may have shortened ICU  LOS and reduced costs. In this research, it was evident that better coordination on the wards improved resource efficiency and shorted ICU discharge delays.

The ICU nurses coordinated the discharge process, especially during the period from immediately after ICU discharge to patient arrival on the ward, by initiating and maintaining communication with ward nurses, and pushing the discharge process forward. The "push and pull strategy", a concept that originated from supply chain businesses, emphasises the importance of both the push (manufacturers providing products or information to the  consumers) and pull (consumers demand product or information) power to mobilise and utilise resources efficiently (Brown & Hagel, 2005). Curry (2000) suggests that when implementing clinical guidelines, the adoption of a push strategy (guideline development and review) and creation of pulling power from the users (demand of guideline implementation when users see the benefit of using it) are important in the success of organisational change. In this research, the ICU nurses pushed the discharge process. This may have been because they could see the obvious benefit of pushing the discharge process, for example, decreased discharge delays and capacity to admit other patients sooner. However, this pushing effort was often not met with the pulling power from the ward nurses. The information on ICU and ward discharge delays was not transparent and readily available; therefore the ward nurses could not see the incentive to pull the discharge process.

This research also found that ICU nurses worked as a safety mechanism in the discharge process and coordinated care among multidisciplinary teams. In a study of how critical care nurses prevent medical errors, Henneman et al. (2010) found that knowing the plan of care, clarifying the care plan with others, and reviewing or confirming care were the strategies critical care nurses used to identify, interrupt and correct errors. ICU patients often have complex care needs which involve various teams, and patients are often seen by each team at different times. Patient safety could be jeopardised if vital information was not communicated between teams. ICU nurses are in a unique position to function as a safety net because of their close proximity to their patients. In this research, the ICU bedside nurses often clarified patient care plans with the multidisciplinary teams and ensured patient care plans were communicated among multiple teams. They played a crucial role by acting as the coordinator of patients' care.

In contrast, lack of coordination in the discharge process may reduce resource use efficiency. Adopting strategies such as the use of a discharge lounge where patients to be discharged can wait for transport and/or discharge prescriptions, and employing extra staff to complete the hospital discharge process on the wards were found effective in shortening hospital discharge delays (Heathcare Financial Management Association, 2006) and improving patient satisfaction (Winchester & Brown, 1992). Other research found that bed cleaning service inefficiency was a major contributor to hospital discharge delay (iSixSigma, 2010). In this study, due to a lack of suitable equipment and insufficient communication among hospital staff, the discharge lounge was not utilised at times when there was a bed block within the hospital, and the priority bed cleaning service was rarely used when ICU needed to discharge patients as soon as possible. With a limited number of available hospital beds, inefficient hospital discharge processes on the wards was considered a main contributor to hospital bed block, and more efficient use of existing hospital beds was the main method to improve hospital capacity (iSixSigma, 2010; Kirby & Kjesbo, 2003; Maloney, Wolfe, Gesteland, Hales, & Nkoy, 2007). The failure to use these services reduced discharge process efficiency. A better coordination among the departments may promote more efficient use of these services.

Coordinated work among staff members has the potential to achieve the third level of situational awareness – predicting future events (Nemeth, 2008). This level of situational awareness enables the members of the group, using collected information, to work together to predict and plan for patient care. It is thought that, at this level of situational awareness, staff members can be proactive instead of reactive in discharge decision-making and activities (Nemeth, 2008). Thus findings from this research suggest that strategies staff used to enhance communication and team coordination, such as regular group meetings, supporting other team members, and acting as safety mechanism, may enable them to achieve smoother discharges, shorten the discharge delays, and achieve better patient outcomes.

## Cognitive Artefacts

Another focus of distributed cognition is how humans interact with artefacts in the cognitive activity system (Hutchins, et al., 2001). Cognitive artefacts are designed for humans to use, to share information in order to achieve coordinated teamwork in large organisations (Nemeth, et al., 2006). In a social environment, how humans use artefacts represents how well the artefacts function in the cognitive activity system. Therefore the final discussion point is concerns cognitive artefacts.

Gurses (2006) identifies three types of cognitive artefacts in complex work systems: patient-oriented artefacts (tools to support patient care planning activities), process-oriented artefacts (tools to support cognitive work processes such as bed allocation), and decision-making support artefacts. This research reaffirms this taxonomy. In the discharge process, patient-oriented artefacts include medical progress notes, medical discharge summary, nursing discharge summary, and ward handover forms; process-oriented artefacts include the ICU patient daily update list and hospital bed management (computer programs, patient list printouts, and Capacity Alert announcement); while discharge support tools include discharge guidelines, the decision makers' professional knowledge, and patient assessment resources such as patient observation charts.  This section discusses the roles of these cognitive artefacts, their common problems, and effects on the discharge process.

### The role of cognitive artefacts in the discharge process

Cognitive artefacts play a crucial role in teamwork coordination and in building shared situational awareness (Nemeth, et al., 2004). This study found that cognitive artefacts played an important role in supporting multidisciplinary communication, transferring information between departments, and ensuring patient safety.

Cognitive artefacts, such as patient progress notes, discharge summaries, and ICU update lists, acted as common reference points and coordinated the communication among multidisciplinary teams, and provided a quick information access point and the basis for information transfer between departments in the discharge process. As suggested by Nemeth (2006), the team members' interaction with artefacts, for example, putting daily patient data into patient information computer systems, can reduce uncertainty, build shared situational awareness, and enable other team members to predict and plan for future patient care. Further, because hospital work processes are often dynamic, as a result of changing patient conditions, changing demands for clinical resources, and the individuals involved in the patient care being highly mobile, cognitive artefacts function as common reference points for the professionals to access information and coordinate patient care (Gurses, Xiao, & Hu, 2009; Nemeth, et al., 2004; S. Wilson, Galliers, & Fone, 2007). For example, in the discharge process, ICU doctors and ward treating teams often documented discharge decisions and care plans in the patients' progress notes. Information presented in the patients' progress notes enabled other team members to make decisions and plan for patient care. Similarly, the ward handover forms and medical discharge summaries acted as quick reference points for ward staff so that they could quickly plan patient care during the transitional period. Thus the various cognitive artefacts used in the discharge process in this study played an important role in building situational awareness among team members from various departments and disciplines when planning patient care.

The use of cognitive artefacts prompted the users to check the status of the discharge process and to carry out discharge activities properly. Wilson et al. (2007) found that updating an ICU medical handover sheet prompted the doctors to do a systems check on the patients' condition. Clark et al. (2009) reported that the use of handover prompt cards and reporting templates, designed according to the SBAR (Situation, Background, Assessment, Recommendation) system (Haig, et al., 2006), improved nursing handover, with more nurses claiming that they always received the information they needed, and more feeling confident in giving handover. Others have demonstrated that the use of informal documentation such as handwritten notes on a hand towel by nurses acted as a reminder about patient information (Hardy, Howarth, Ryan, & Henderson, 2002; Philpin, 2006). McFetridge et al. (2007) recommend that cognitive artefacts such as written handover should always accompany the verbal handover to ensure future information retrieval. In this study, the process of ICU doctors documenting patient assessment details in the progress notes before patient discharge not only provided a permanent record of information about the discharge decisions, but also an opportunity for the doctors to systemically check whether the patients were suitable to be discharged. The use of a handover form by some ward nurses ensured the ICU to ward phone handover contained a minimum dataset, and provided a structure for the handover. It also helped junior staff to ask questions during handover. The introduction of a discharge plan (the content of which was similar to the combination of the ICU nursing discharge summary and the ward form for documenting ICU handover in this research) has been associated with decreased preventable adverse events after ICU discharge (T. A. Williams, Leslie, Elliott, et al., 2010). Thus some cognitive artefacts play an essential role in ensuring patient safety in the discharge process.

Cognitive artefacts were an integral part of the discharge process and they play a crucial role in aiding clinical communication and coordination, and optimising patient safety. However, data analysis revealed that, when the use of artefacts by numerous participants was scrutinised, there were a few problems that needed to be addressed.

**The use of cognitive artefacts in the discharge process**

This study found that some cognitive artefacts were not being used effectively (i.e. bed management artefacts and the nursing discharge summary) or their usefulness was unclear (i.e. the ICU discharge guidelines). In Chapter Five under the subheading of *Rules, Tools,* and *Division of labour,* and the theme *Failure to enact the organisational processes* in Chapter Six, the findings related to cognitive artefacts used in the discharge process were described. Data analysis of how the cognitive artefacts were used revealed that there was a lack of regular evaluation and improvement that involved all users; a lack of training on how to use the cognitive artefacts; the usefulness of some artefacts were unclear; and cognitive artefacts were not available in some situations.

A number of cognitive artefacts, including Capacity Alert announcements, hospital bed management tools, and nursing discharge summaries, were not used effectively because there was a lack of regular evaluation and improvement of these artefacts. Cognitive artefacts are often used by various professional groups at different times and locations to share and transfer information, and users need to modify and improve the tools to suit their changing needs in a dynamic system (Hutchins, et al., 2001; Nemeth, et al., 2006). A tool's usefulness to each of the users is important to ensure optimal communication across teams. The interactions between the user and the cognitive artefacts also demonstrate the value of the artefacts (Nemeth, et al., 2004). Croker and Keller (2005) found that effective use of tools could optimise the discharge process and improve communication among staff. Many studies have found that computer programs were effective tools used to manage hospital bed allocation and share patient information in large hospitals (Maloney, et al., 2007; Nadzam, 2009; Nicholls & Young, 2007). Various tools were available to aid communication and bed allocation in this hospital. However, because of the lack of evaluation, problems with the announcement of Capacity Alert, the reasons why hospital bed management tools were underused or not used, and why ward nurses did not refer to the ICU nursing discharge summary, were not discovered and improved in practice. For example, an evaluation of the use of ICU nursing discharge summary by all its users (ICU and ward nurses) may have revealed that there were variations in the amount of information documented by ICU nurses, and that some ICU nurses were unaware of who were the intended readers of this discharge summary. Consequently, it was rarely referred to by ward nurses due to these problems with this tool.

Hutchings et al. (2001) suggest that cognitive processes are distributed through time where earlier events transform later events. Thus, how staff members interact with discharge artefacts may have a flow-on effect in the distributed cognitive system, which may in turn, influence the overall outcomes. As suggested by Wilson, Galliers and Fone (2007), if any problems were identified while the cognitive artefacts were tested in real-life situations, improvement measures should be taken. The lack of evaluation and lack of all user involvement in evaluation led to a failure to identify the problems. Consequently, some cognitive artefacts were continuously being used in a dysfunctional way, which did not support clinical communication and work processes as much as expected. Given the significant role cognitive artefacts play in supporting communication and coordination in the discharge process, these problems may contribute to poor communication, suboptimal discharge efficiency, and patient outcomes.

The involvement of all users in the development and evaluation of cognitive artefacts is equally important. In large organisations, cognitive artefacts are often used by various staff members at different locations to suit their cognitive needs (Hutchins, et al., 2001). An artefact may seem to work well for one group of users in one location, but may fail to meet the needs of others with different tasks on hand. In a study that surveyed 600 Swedish hospital departments, Kunkel, Rosenqvist, and Westerling (2009) found that while leadership was important, clinical staff members' contribution in the planning and designing phase of new organisational strategies was crucial. This contribution ensured that the implementation of new strategies was carried out with the cooperation of hospital staff. In this study, hospital staff stated that they had minimal input in the development and the continued use of the Capacity Alert strategy. They felt that this strategy did not work, yet the hospital bed management team continued to use it. Improved communication between staff and the hospital bed management team, and a combined team approach to evaluate the Capacity Alerts strategy, may be needed to help all staff to better understand the bed management process and make improvements together.

In addition, there was limited training for Junior Doctors on how to complete the medical discharge summaries, which were mostly completed by the Interns, and there was also minimal checking of the completed summaries by other staff members. Most of the available research literature on discharge summary relates to patient transfers from the hospital to home or community healthcare providers and agencies (Kripalani et al., 2007). In a literature review, Kripalani et al. (2007) concluded that while there was agreement that the discharge summaries were important communicative tools between the hospital staff and community healthcare providers, many studies found common, and potentially dangerous errors in the hospital discharge summaries. A study found that cross-checking of the ICU physician's transfer summary for patient transfer from ICU to the wards found that 62% of the examined reports had errors, of which 14% were serious and 5% were critical errors (Perren, Conte, Bitonti, Limoni, & Merlani, 2008). Perren et al. concluded that cross-checking discharge summaries by nurses could prevent potential adverse events.

Users' knowledge deficit about artefact use may contribute to preventable adverse events according to the literature. In one study, during patient transition from ICU to the wards, ward nurses thought the documentation completed by ICU nurses was problematic, a finding concurrent with the study reported here (Häggström, et al., 2009). Therefore in this research, the lack of training related to and checking of the medical discharge summaries could potentially contribute to serious adverse events.

Further, the usefulness of the ICU discharge guidelines was unclear. The ICU discharge guidelines were one of the cognitive artefacts available for ICU staff to aid their discharge decision-making. Intensive care professional organisations suggest that all ICUs should have discharge guidelines (Joint Faculty of Intensive Care Medicine, 2003; Society of Critical Care Medicine, 1999); however, there is limited literature on discharge guideline use in the ICU discharge process and patient outcomes (Lin, et al., 2009). Research suggests that organisational guidelines and policies in ICU patient clinical management are effective tools to improve patient outcome and shorten ICU

LOS (Holcomb & Wheeler, 2001; Imhoff, 2002; Kern & Kox, 1999). This research showed that ICU discharge decision-making was in line with the current discharge guidelines recommended by SCCM (1999). However, not all discharge decision makers refer to the discharge guidelines explicitly for each discharge decision. There has been a consensus that due to the complexity of ICU patients' illnesses, discharge decisions should be clinically driven and made on a case-by-case basis according to the consultants' clinical judgement, in combination with the use of guidelines (Judson & Fisher, 2006). Therefore discharge decisions may vary among different decision makers. In this research, interviews confirmed that there were variations in discharge decisions among ICU Consultants. At the same time, ICU nurses' decision-making followed the guidelines implicitly in utilising ICU beds and discharging patients when ward beds became available late in the evenings, because the guidelines specified that patients were to be discharged when they no longer need ICU care. Although the effectiveness of the discharge guidelines is not clear, there is consensus that they offer a basic foundation for discharge decision-making. Thus further research is needed to explore the usefulness of guidelines for ICU discharge decision-making.

Finally, this research found that there was no discharge protocol related to the timing of discharge for patients who had been waiting for beds since the discharge decision was made during the morning round, but who had to wait for a ward bed to become available, and were subsequently discharged to the wards after-hours. These discharges are called *delayed after-hours discharges* to differentiate them from other after-hours discharges. Many researchers found that after-hours discharge was associated with increased mortality (Beck, et al., 2002; Duke, et al., 2004; Goldfrad & Rowan, 2000; Laupland, Shahpori, Kirkpatrick, & Stelfox, 2008; Priestap & Martin, 2006; Tobin & Santamaria, 2006). However, there is still a gap in clinical research related to after-hours ICU discharge. Most of the empirical studies failed to differentiate the delayed after-hours discharges from the discharges that occurred as a result of bed pressures after-hours, which were often premature discharges (Duke, et al., 2004). Whether delayed after-hours discharge increases patient mortality is unknown. Some hospitals have protocols in place to ensure that transfers between units can only happen during 9:00 am and 8:00 pm due to safety concerns (Humber Mental Health Teaching NHS Trust, 2010). Furthermore, although there has been mounting evidence that after-hours discharge increases mortality, whether routine after-hours discharge (patients deemed to be ready for discharge and subsequently discharged to the wards during after-hours ICU rounds) still exists in practice is unknown. The late discharges from ICU could potentially put the patients at risk due to the limited medical cover available on the wards after-hours. Therefore further research is needed to guide clinical discharge decision-making to ensure patient safety after ICU discharge.

**Summary**

In summary, ineffective communication and competing priorities sometimes resulted in a lack of shared situational awareness among the teams from various departments. This further contributed to poor teamwork and may have contributed to adverse events after ICU discharge. Hierarchical power and authority influenced all aspects of the discharge process, including decision-making, teamwork, and communication. Junior staff not speaking up in front of senior staff did not result in observed errors in this study, but did increase the risk of error and may have had patient safety implications. Coordination among teams optimised the discharge process and shortened discharge delays. Cognitive artefacts such as ward forms facilitated communication in the discharge process. However, some cognitive artefacts failed to evolve in the process of being used by different staff members at various locations due to the lack of regular evaluation and lack of input by all users in tool implementation and evaluation. The development of some artefacts such as the medical and nursing discharge summaries lacked an interdisciplinary approach. The usefulness of the ICU discharge guidelines needs to be further explored in future research, and an after-hours discharge protocol is needed to ensure patient safety.

## Implications and Recommendations

The findings of this research call for action to consolidate current good practice and to improve practice where necessary. This section provides recommendations for clinical education, research, and practice improvement, including building shared situational awareness, maximising teamwork, and redesigning cognitive artefacts.

### Building shared situational awareness

The lack of shared situational awareness among team members and across departments needs to be addressed. Education on adopting strategies to optimise shared situational awareness and clinical communication should take place where this is required. Complete situational awareness might be impossible, but optimal situational awareness is crucial to guide teamwork coordination (Eisenberg, 2008) and situational awareness training is essential in teamwork training (Durso & Sethumadhavan, 2008). To improve situational awareness among team members and across departments and teams, strategies such as predictions of patient discharge dates, regular updates of patient condition, and clinical communication should be implemented to enable all team members to forward plan for patient care. This may encourage information sharing and working towards shared goals, and further improve patient flow.

Three levels of organisational dialogue should be promoted to achieve optimal shared situational awareness: *equitable transaction* occurs when all team members have the equal opportunity to voice their concerns; *empathic conversation* takes place when all team members communicate employing the principle that every team member's contribution is crucial to the team's success; and finally, *real meeting* happens when team members see each other as whole human beings, not just an individual performing certain tasks (Eisenberg, Goodall , & Tretheway, 2007). To achieve equitable dialogue, empathic conversation and real meeting, regular group meetings among all staff offer the opportunity to communicate important information, promote common understanding, and avoid conflicts. All staff, especially the junior nurses and junior doctors, should be given the opportunity to attend these group meetings. Particularly, junior staff should be encouraged to voice their concerns and be reassured that their concerns and contributions to these meetings are important to the organisation's success. Understanding what others are experiencing and how others make decisions, and providing others with the information they need, will promote better communication and teamwork coordination.

Some may argue that holding extra communication sessions takes too much time. However, the time spent on building better shared situational awareness may be offset by improved discharge efficiencies and better patient outcomes. Better shared situational awareness will also further promote shared objectives in the various interacting discharge activity systems and optimise discharge process.

**Improve teamwork**

As observed in this study, there are many good teamwork practices involved in the ICU discharge process; however, there is still room for improvement. Reinforcing leadership involvement in clinical practice change programs, improving communication among teams within and across departments, and consolidating and promoting some of the current good practices in coordinated teamwork are the three areas that should be considered.

Practice improvement involves changes in the way staff work and communicate with each other. It has been suggested that organisational leadership is crucial to make change (Flin, et al., 2008). Team training, such as TeamSTEPPS training strategy, may improve hospital resource efficiency, staff satisfaction, and patient outcomes (Salas, et al., 2008; Stead et al., 2009). The research findings showed that staff in higher positions had significant influence in the discharge process. Therefore leadership involvement will facilitate the success of discharge improvement activities. Staff members in senior positions need to actively address the importance of open communication, encourage junior staff members to express their opinion and ask questions in the discharge process to combat the drawback of the hierarchical order, which may further improve patient safety and decrease preventable adverse events.

Communication among teams and across departments and clinical handovers could be improved. Problems identified in clinical handover call for actions to change the handover practice. Marshall, Harrison and Flanagan ( 2009) conducted an intervention aimed at improving interdisciplinary communication. They found that the quality of the final-year medical students' clinical handovers improved after training of in the use of the SBAR (Haig, et al., 2006) handover principles. Clinical handover aims to develop a shared situational awareness within the hospital about patient conditions. Education on clinical handover principles, including handover methods such as SBAR, should be conducted for all clinical staff to ensure optimal communication and patient safety. Importantly, the clinical handover process should be standardised to ensure the handover process follows the handover principles recommended by current leaders in clinical handover (New South Wales Health, 2009). It is imperative that the quality of the ICU to ward nursing handover is high and face-to-face handover should be given priority according to clinical handover principles. Strategies such as the medication safety vest, which says “Do Not Interrupt”, may be a good strategy to prevent interruptions during clinical handover (Agency for Healthcare Research and Quality, 2010). The handover receiving party must be given the opportunity to ask questions to ensure information given was received and understood. Strategies such as regular reviews needed to be put in place to evaluate the clinical handover effectiveness and make continuous improvements to ensure patient safety (Australian Commission on Safety and Quality in Health Care, 2010). Joint medical and nursing ward rounds and opportunities to communicate daily patient care plans among teams in each department may help to ensure team members’ awareness of what is going to happen in a timely and efficient manner.

Staff education programs, such as structured orientation for ICU junior doctors, may help junior doctors gain confidence to ask questions and speak up in teamwork situations. At the same time, a culture of knowledge sharing should be encouraged. That is, senior staff members, such as ICU Consultants, need to explain their discharge decision-making processes to the junior doctors in order to teach them clinical decision-making skills. ICU nurses' involvement in discharge decision-making needs to be more proactive than passive.

There were many good practices in teamwork coordination observed in this study, which deserve to be adopted by all ICUs and further improved where necessary. ICU nurses' support of junior medical staff is vital to effective ICU discharge. Regular meetings between nursing and medical teams within all departments should be adopted to optimise the discharge process. The ICU nurses' pushing efforts in discharge should be matched by ward nurses' pulling power. For example, ward nurses working on shortening ward discharge delays, and providing ICU nurses with an estimated time of patient transfer, may improve ward resource efficiency and help the ICU nurses to forward plan patient care, and prepare for further admissions. Strategies that enable ward nurses to see the benefit of pulling the discharge process, such as information on shortened ward discharge delays, are needed to encourage continued efforts in discharge process improvement.

**Redesign and improve cognitive artefacts**

User-friendly, complete, and appropriate cognitive artefacts to support the ICU discharge are required. Staff from ICU and the wards need to work together to redesign cognitive artefacts, such as the discharge summary, to reduce ambiguity and improve the usefulness of the tools used in ICU discharge. Similarly, tools that improve interdepartmental communication should be adopted and evaluated regularly to ensure the effectiveness of the tool (Chaboyer, McMurray, & Wallis, 2008). For example, forms to document clinical handover between departments should be adopted in all ICU discharge handovers to ensure that essential information is transferred in the ICU patient discharge process. To ensure all cognitive artefacts are used effectively in clinical practice, regular evaluation should take place with input from all users (Nemeth, et al., 2004). Improvements should be made if problems are identified during the evaluations (S. Wilson, et al., 2007). Education should be provided to staff regularly to ensure all staff members are confident to use the tools and become aware of any changes made.

There appeared to be an urgent need to improve hospital bed efficiency. The hospital bed management team has a strong focus on reminding staff to discharge patients home; however, the issues of the ward discharge delay were over-looked. This study found that the ward doctors' competing priorities appeared to be a contributing factor to hospital patient discharge delays. The hospital bed management team need to consult ward level staff to adopt an organisational approach on how to how to complete ward patient discharge process more efficiently.

Organisational strategies should be communicated well and the usefulness of these strategies should be evaluated regularly. For example, if a system like Capacity Alert is used, then the announcement of Capacity Alert should have clinical staff input from all relevant departments, and feedback on the outcome of the announcements should be collected and communicated with hospital staff. According to situational awareness principles, all staff should have the opportunity to have input in the evaluation process to ensure the quality improvements represent the opinions of the whole community (Nemeth, 2008).

The effective use of organisational resources needs to be further explored. First, the effectiveness of strategies such as the use of discharge lounge needs to be analysed and evaluated. In this study, the discharge lounge was not used effectively and the issues with underutilisation should be identified. Second, some strategies need to be improved. For example, in this study, to better utilise the priority bed cleaning system, a priority-tagging system incorporated into a computer program may be useful so that beds needing to be cleaned urgently can be easily identified and bed cleaning services alerted efficiently. Finally, to improve resource efficiency, the best use of hospital resources, including specialty ward resources, should be discussed with hospital staff. As suggested by some participants, specialty areas should be protected to ensure specialty services are kept for those in need of these services.

When ICU patients are discharged after-hours sicker than usual, a strategy should be in place for these patients' care on the wards after ICU discharge. For example, a backup ward doctor or ICU doctor may be a strategy to provide these patients timely medical reviews on the wards when needed. This may relieve the ICU Registrars from visiting these patients on the wards, and avoid leaving the critically ill patients in ICU unattended. The use of a discharge timing protocol focusing on discharge times may help to restrict after-hours discharge and decrease risks to patient safety.

**Future clinical research**

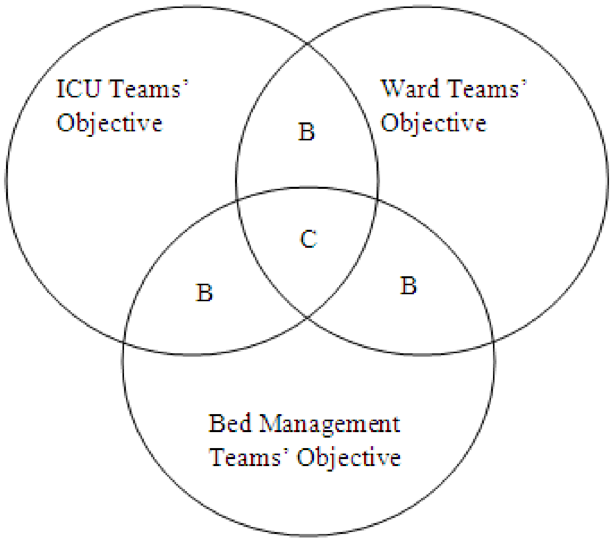
This study demonstrated that qualitative research method provided a rich depth of understanding of the discharge process which allowed the underlying issues in hospital processes to be uncovered. Several themes identified in the study, such as *Hierarchical power and authority* and *Competing priorities*, have the potential to influence organisational change. These significant issues need to be considered when making change and improving clinical practice.

The findings of this research call for further clinical research in a number of areas within this hospital. First, research to implement and evaluate new processes and the use of new and current cognitive aids such as discharge summaries and whiteboards to communicate patient movement information may be beneficial. Second, the influence of delayed after-hours discharge on patient outcomes should be explored. Third, innovative patient flow management research is needed to ensure the efficiency of hospital resources, and efficient communication on resource availability among all departments within hospital. Finally, research on the development of guidelines and policies on discharge decision-making should be further explored.

## Theoretical and Methodological Contributions

The use of activity theory and distributed cognition as theoretical frameworks in this study suggests that both theories have their own strengths and weaknesses. This research demonstrated that the combination of the two frameworks offered the *micro* and *macro* view of the complex healthcare work systems and provided the researcher with a richer and more thorough view of clinical practice at both the local level (the wards) and the organisational level (the hospital). Cognitive ethnography proved to be an appropriate method to study the discharge process.

Using activity theory, the current state of the local discharge activity was uncovered. Viewing people as drivers of the activity, with the focus of researching the mediating factors such as tools, rules, and division of labour, offered the researcher the structure to observe and analyse the current state of the activity at the local level. First, by applying this theoretical framework, many activities within the complex work system were observed and analysed separately, but then the interactions among the activities became evident. Figure 8 demonstrates the shared objectives in the discharge process. The gaps and breakdowns in the interactive activity systems identified call for change to improve the discharge process.




B: shared objectives between two neighbouring discharge activities;
C: shared objectives among all discharge activities.
If C is too small, it may result in gaps, communication breakdowns, reduced resource efficiency, and suboptimal teamwork.

Figure 8 Shared objectives in ICU discharge activity

Although activity theory focuses on the interactions of various activity systems, such as the ICU discharge activity system and the ward discharge activity system, it does not elucidate how the process functions at the organisational level. For example, the ICU to ward nursing discharge summary was identified as a tool in the ICU discharge activity. It seemed to be a good tool to summarise patients' stay in ICU. However, when studying ward admission and discharge activities, this tool was not identified as a tool ward nurses used. Using activity theory alone may have resulted in a uni-dimensional understanding of ICU discharge.

By observing and interpreting the discharge activities from a different viewpoint under the guidance of distributed cognition, the researcher could identify problems and explore the local impact of activities that were not obvious when activity theory was used. Distributed cognition provided a broad view of how the discharge process was completed through the works of multiple actors by using the cognitive artefacts at different locations. The focus of distributed cognition was not on the individuals or the artefacts alone, but rather it scrutinised how the two interacted. It is this interaction that provided the researcher the clear view of how the distributed process evolved and what was needed to transform the process. The relationship among the individuals was also studied. By tracking and analysing how the nursing discharge summary was used by both ICU and ward nurses, problems were identified. Similarly, the impact of the underutilisation of bed management computer programs on discharge was not obvious at the local activity level from the activity theory perspective. However, when viewing this from the distributed cognition viewpoint, this impact became much more evident. The hospital Bed Managers were forced to collect bed availability information physically and manually, which slowed the process down.

This research demonstrated that using both theories could be a method for data triangulation. Activity theory and distributed cognition view the cognitive discharge activities from different angles. The findings of each phase of data analysis were verified and confirmed against each other, thus strengthening the research rigour. This research demonstrated that distributed cognition provided the framework for the researcher to analyse the interactions of the individuals, artefacts, and teamwork. The gaps and breakdowns identified in this higher level analysis support the need for organisational reform to improve clinical practice. However, distributed cognition alone could not have offered the detailed understanding of the current states of many activities in large organisations. Therefore, by combining both theories, this research overcame the limitations of each theory and provided a thorough understanding of the ICU patient discharge process.

Cognitive ethnography allowed the researcher to have a clear aim in data collection. It reduced the time needed to observe the clinical practice when compared to traditional ethnographic methods. Having a clear aim meant the observations of clinical practice could have a smaller focus, but at the same time still allowed the researcher to have an open mind and look for information related to the research aim. Cognitive ethnography made it possible for the researcher to carry out the research in a much shorter timeframe than traditional ethnographic methods, which was beneficial given the constraints.

## Limitations

This study has a number of limitations. First, this research was carried out in one public hospital. The results may not be able to be generalised to other public hospitals in Australia. However, this research was conducted in a 580-bed metropolitan tertiary teaching hospital. It contains a level 3 adult ICU in the three-level classification system (Society of Critical Care Medicine, 1999). The setup of the ICU, including staffing levels, patient-to-staff ratios and equipment standards were at Australian standard level (The Joint Faculty of Intensive Care Medicine, 2003) according to the statistics data published by ANZICS (Drennan, et al., 2008; J. Martin, et al., 2006). Thus, the research methods may be replicated in similar organisations to study similar processes in the future. Additionally, the findings and recommendations may be applicable to other similarly sized hospitals that meet these similar standards.

Second, the context of the hospital could affect the findings. For example, this hospital was originally a regional hospital which was developing into a large metropolitan hospital. There were many employees who had been working for the hospital for many years. These employees may have informal power which may have influenced work practices and processes. Furthermore, a group of active ICU researchers conducted studies on discharge delays in this ICU for a number of years prior this study. For example, the use of ICU liaison nurse was the result of an interventional study. This may have contributed to the findings that the ICU was proactive in discharging patients. The hospital's initiative of using a night nursing consultant to identify deteriorating patient may have also influenced the ward staff members' perception on accepting high acuity ICU patients.

The third limitation was the researcher as the research instrument. There may be occasions when I became insensitive to some issues and cues with which I was familiar. That is, my years of clinical experience as an ICU nurse may have made me take some things for granted. However, to study a complex distributed cognitive system, the researcher needs to have a deep understanding of the context and research environment (Roper & Shapira, 2000). My clinical experience gave me in-depth knowledge about the research domain. Further, regular discussions with my research supervisors offered me the opportunity to overcome this limitation.

Fourth, medical communication across departments, for example, the ICU to ward doctors handovers, was not observed. There were many wards that received patients from ICU during data collection and each ward had numerous doctors involved in the discharge process. With the doctors' competing priorities, it became impossible for the researcher to both gain consent from ward doctors and find a suitable time to interview the ward doctors.

Next, patients were not observed in this research. At the planning stage of this research, there was a consensus that patients had limited input and influence on the ICU discharge decision process, and that discharge decision-making was clinician driven. The observations of the discharge process confirmed that the patients had minimal involvement in the discharge decision-making process. They were rarely consulted before discharge decisions were made. They were often informed of the discharge decisions after the discharge decisions were made and were generally not given the opportunity to choose a private or a shared room. Therefore the impact of not observing patients may not be an issue for this research. However, the extent of patient involvement in current clinical practice is unknown. Current Australian healthcare policy recommends that patients should become partners in clinical decision-making to ensure patient safety (Australian Commission on Safety and Quality in Healthcare, 2008), and therefore future research on patient involvement in the ICU discharge process should be conducted.

Finally, my presence during data collection may have affected the way participants worked. This is a common limitation in observational research. I carried out the data collection in a continuous three-month period, during which I spent an average of 8-10 hours a day with the participants. Participants may have become used to my constant presence, thus minimising this limitation.

## Conclusion

The ICU discharge process is a complex process that involves multiple health professionals and various departments in hospitals. Many aspects of the ICU discharge have been studied such as discharge timing, patient acuity at discharge, teamwork, and resource influences. However, the ICU discharge process as a whole has not been studied. The aim of this research was to explore the ICU discharge process in an adult ICU to provide evidence for clinical practice improvement and further improve patient safety.

This research demonstrated that using activity theory and distributed cognition as complementary frameworks and adopting cognitive ethnographic methods in this study was an effective approach that provided an in-depth understanding of the discharge process. It revealed the strengths of the complex work system, and identified underlying vulnerable areas that needed improvement. Activity theory provided the view of the current state of the discharge activities at the local level, while distributed cognition gave a broader understanding of how the clinical practice evolved, and was transformed in real settings. Future research may be needed to provide more insight into the use of the two theories to study large cognitive activity systems.

Five themes arose from the data analysis: *Hierarchical power and authority, Competing priorities, Ineffective* communication*, Failing to enact organisational processes,* and *Working collaboratively to optimise the discharge process.* A lack of situational awareness was found to be a problem which contributed to issues in teamwork, including communication and coordination within and across teams. It also influenced discharge decision-making and resource use efficiency. Staff in higher positions had a strong influence on the discharge process. These staff members' personal preferences and decisions on discharge were accepted by staff with less power. At the same time, many organisational strategies that aimed to optimise discharge failed due to lack of response from staff and ineffective communication among team members. The hospital bed cleaning system and the discharge lounge were not used efficiently, which caused ICU discharge delays. In contrast, the collaborative work between some teams and across departments optimised the discharge process by increasing communication, providing outreach services, and supporting inexperienced team members. ICU nurses played a crucial role in pushing the discharge process, ensuring discharge decisions were communicated among the doctors, and checking medical discharge paperwork was completed properly. However, this was on occasion viewed as counterproductive by ward Senior Nurses.

The ICU discharge process involved three discharge activity systems at the local level: the ICU discharge activity, the ward accepting patient activity, and hospital bed management activity. There were various s*ubjects* involved in the discharge process. ICU Consultants were the decision makers, while ICU Registrars, ICU Senior and Junior Nurses, ward treating doctors, and ward Senior Nurses, and hospital Bed Managers contributed in the discharge decision making. From the perspective of ICU staff, the *objective* of the discharge process was to discharge patients to ward as soon as possible. Accepting ICU patients, however, was only part of the ward management team's objective and ICU patient discharge was not considered priority sometimes. There was a variety of *tools* used in the ICU discharge process. ICU Junior Doctors did not have any training on how to complete some of the discharge paperwork, such as the medical discharge summary. The nursing discharge summary lacked clarity. Ward forms for taking phone handovers from ICU optimised the information transfer between ICU and wards. The hospital bed management system lacked transparency and accuracy. Computer programs in the hospital for bed management were not used sufficiently, which may have impeded the ICU patient discharge process through communication breakdowns and discharge delays. The *Community* involved in the ICU discharge process included staff from ICU, the ward, support services such as bed cleaning services, the wardsmen, and hospital bed management staff, who are all part of the ICU patient discharge community.

The *rules* involved in the ICU discharge such as the implementation of a Capacity Alert system as an organisational strategy to push the discharge process within the hospital, was perceived as problematic. It may also have contributed to the negativity among hospital staff. ICU discharge guidelines were in place but few ICU participants were aware of their existence and they were rarely referred to in discharge decision-making. Variations in discharge criteria existed among the ICU Consultants. ICU doctors reviewed patients discharged after-hours on a needs basis to ensure their safety. However, the patients who were discharged to ward after-hours were often not reviewed by any doctors until the next morning. The ward rule of putting ICU patients into private rooms delayed the discharge process. With respect to *division of labour*, the majority of the participants were clear about their roles and responsibilities in the discharge process, with the occasional cross-tasking, such as Senior Doctors carrying out the tasks supposed to be undertaken by Junior Doctors. Little discharge planning took place in ICU.

These findings suggest that the ICU patient discharge process should focus on building shared situational awareness, improving teamwork, and redesigning and improving cognitive artefacts. Team training to improve situational awareness is important for staff development and for healthcare professional education. This may enable a timely identification of barriers to teamwork and bring to the surface underlying problems in the complex system, so that an optimal level of shared situational awareness can be achieved.

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# APPENDIXES

## Appendix 1 Published Literature Review

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Lin, F., Chaboyer, W., & Wallis, M. (2009). A literature review of organisational, individual and teamwork factors contributing to the ICU discharge process. *Australian Critical Care*, *22*, 29-43.

## A literature review of organisational, individual and teamwork factors contributing to THE ICU discharge process

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## Introduction

Improving patient safety and patient outcomes has emerged as a priority for hospitals in the last 20 years. The US Institute of Medicine's (IOM) report to Congress "To err is human" provided a coherent set of directions that set the agenda for patient safety worldwide.[1] The IOM defines healthcare quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge".[2] The IOM definition suggests a broad approach to measuring healthcare quality in terms of data-desired outcomes and related processes of care. The IOM's six aims of health care, safe, effective, patient-centred, timely, efficient, and equitable,[2] provides an direction for improving patient safety and the quality of health care. It is against this context that a literature review of the ICU discharge process was conducted.

The Intensive Care Unit (ICU) is an essential component of most large hospitals in the modern healthcare system, providing critically ill patients with high quality care. In addition, patients undergoing major surgery often require ICU admission postoperatively. In Australia in 2004-2005, elective surgery accounted for 31.4% of ICU admissions and emergency cases accounted for 46.3% of ICU admissions.[3]

Intensive care resources are limited and expensive commodities. In 2002-2003, one study found that the average cost of an ICU bed in Australia was A$2670 per day and the total stay per patient was A$9852.[4] Australia has significantly fewer ICU resources than other western countries.[5] In 2002, the available ICU beds per 100,000 population was 25 in Germany, 24 in USA, 11 in Switzerland, and 10 in The Netherlands.[5] In contrast, Martin et al.[3] reported that in 2004-2005, there were only 6.1 ICU beds per 100,000 populations in privately and publicly funded institutions in

Australia. Using the number of beds per population to argue shortage of beds is debatable, because research shows that patient acuity is lower in countries with more ICU beds. This may indicate that some ICU resources might be more optimally utilised.[6] However, a lack of beds relative to population and the high cost suggests that optimal use of the existing ICU beds is imperative in coping with the increasing demand for ICU beds in Australia.

It would appear that optimal bed flow is critical to ensure high quality of care under current ICU capacities, given that ICUs are often under forward pressure from areas such as Emergency Department (ED) or Operating Theatre (OT) for beds[7]. Discharging patients is one way to relieve this pressure but clearly the risk of premature discharge[8] must be managed. At the same time, lack of beds in other parts of the hospital can also cause discharge delays. One study identified that 46% of unsuccessful discharges from ICU were due to a lack of ward beds or disagreement over admitting services in the wards, and one in six discharges were unsuccessful on the first attempt.[9] Often patients cannot be admitted into ICU because it is full, which may be because the ICU beds have been taken by patients waiting for ward beds, a situation referred to as discharge delay, "bed-block" or outflow limitation.[10, 11] On occasion, a patient may be discharged prematurely to the ward because a sicker patient from ED or OT needs the ICU bed.

Discharging an ICU patient is a complex, multidisciplinary process, involving collaboration among physicians, nurses, managers, ward clerks, and support systems, both in ICU and across other hospital departments. Effective teamwork and coordination among staff can optimise the ICU patient discharge process and patient outcomes. The following section discusses the conceptual framework for this literature review.

**The conceptual framework of the review: Factors influencing ICU patient discharge processes**

The ICU patient discharge process may begin with a patient's admission to ICU when some of the discharge paperwork is started, and does not finish until the patient is transferred to the ward. Many factors can potentially cause problems. In the last two decades there has been increasing interest in researching factors that may contribute to patient outcomes in hospitals.[12-15] In the 1990s, Reason[13, 16] identified that adverse events in complex healthcare systems may result from either active or latent failures. Active failures in a hospital setting are usually "committed" by the person closest to the patient, and this can lead to immediate adverse patient events. Latent failures, in contrast, refer to less apparent failures of organisation or design that contributed to the occurrence of errors.[17] Latent failures often arise from management decisions that determine working conditions. Although active failures are much easier to identity than latent failures, identifying the latter could have a much larger effect on improving the working environment and patient safety.

Following this work, Vincent[14] and Pronovost et al.[15] identified a framework of six factors that may contribute to adverse events in clinical practice. The factors included: (i) *patient factors*, including clinical conditions, language, and social factors; (ii) *task factors*, including availability or use of protocols, test results, and accuracy of test results; (iii) *individual factors*, including knowledge, skills, competence, fatigue, failure to follow established protocols/procedures, motivation and attitude, and physical, mental health; (iv) *teamwork factors*, including verbal or written communication during handover, routine care and crisis, supervision and seeking help, and team structure and leadership; (v) *working conditions*, including staffing levels, skills mix, workload, availability or maintenance of equipment, and administrative and managerial support; and (vi) *organisational and management factors*, including financial resources, time pressures, and physical environment.

Based on these earlier frameworks, in this literature review, factors contributing to the ICU patient discharge process were grouped into four broad domains: organisational factors, individual factors, teamwork factors and patient factors (See Figure 1). Working conditions, organisational and management factors together were considered as organisational factors. The aim of this literature review was to critically analyse current literature related to factors that influence the ICU patient discharge process. It examined how organisational factors, individual factors and teamwork factors influence the ICU patient discharge. Patient factors, a widely well-researched topic, [18, 19] were excluded to limit the review to a manageable length.

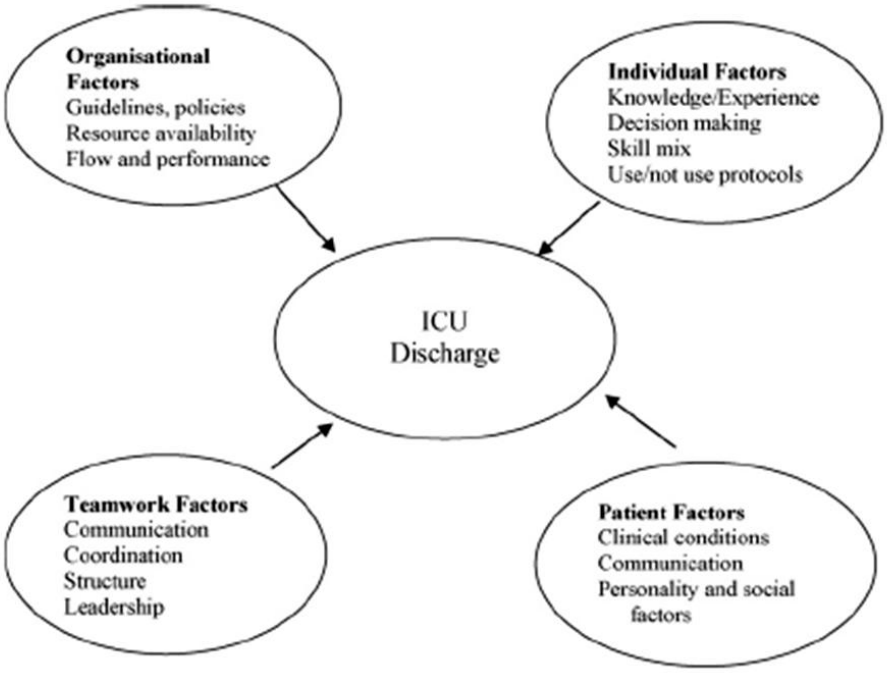


**Figure 1** The ICU patient discharge process conceptual framework.

## Methods

Databases including CINAHL, MEDLINE, PROQUEST, SCIENCE DIRECT were searched using key terms such as ICU discharge, discharge process, discharge policies, ICU guidelines and policies, discharge decision making, ICU and organisational factors, ICU and human factors, and ICU patient transfer. Web search and the "snow-balling" search of reference lists of articles were also used to locate relevant literature.

On the basis of this literature, the "ICU patient discharge process conceptual framework" was devised to facilitate the inclusion of articles for the review. Published policy, guidelines, and government reports related to ICU or High Dependency Unit (HDU) patient discharge, primary research articles on the influence of organisational factors, individual factors, and teamwork on ICU patient discharge processes and subsequent patient and organisational outcomes were included with no limitation on the year of publication. Articles were included if they were: 1) either qualitative or quantitative studies; 2) carried out in any type of ICU/HDU; and 3) directly related to the ICU patient discharge process. Articles were excluded if they were not specifically about ICU/HDU patient discharge. A total of 21 articles were included in the review.

## Results

Among the included articles, ten articles were on organisational factors including four reports, policies and guidelines, and organisational interventions regarding ICU discharge (see Table-1), five were on individual factors (see Table–2), and six were on teamwork factors (see Table–3).

### Organisational factors

Articles on guidelines and policies, resource availability, and organisational interventions on flow and performance, were included under one broad domain as organisational factors (see Table-1) for discussion. Reports, policies and guidelines articles are not listed in the Table-1 due to the large amount of information included and the word limits of this paper.

<u>Guidelines and policies</u>

Only a few critical care organisations have written guidelines for the ICU patient discharge process. The Society of Critical Care Medicine (SCCM)[20] provides the most detailed admission and discharge criteria, focussing on diagnostic groups, clinical judgement of the need to support or monitor organ functioning, objective physiological parameters, and the stability or instability of physical conditions. According to the SCCM, ICU patients can be discharged when they are deemed to "no longer need ICU services". However, when there are limited ICU beds available, patients can be admitted and discharged by *triage* instead of through routine review processes. Due to the risks associated with triage, such as premature discharge,[8] the SCCM recommends that only ICU directors have the authority to make the decision to admit and discharge patients using this method.

The Intensive Care Society (ICS)[21] Guidelines on Admission and Discharge to ICU and High Dependency Unit recommends the type of patient that should be admitted to the ICU; however, discharge criteria or guidelines are not specified. The Australian and New Zealand Intensive Care Society (ANZICS) has issued a document on minimum standards for ICUs which specifies that all ICUs should have clearly defined policies for discharge of patients, but it does not have a guideline for ICU patient discharge.[22] Although guidelines and policies are considered effective management tools to reduce ICU length of stay and improve the utilisation of ICU resources,[23-25] one study indicated that only 18 out of 46 (39%) ICUs had written discharge criteria.[26] Heidegger et al.[27] suggested that lack of agreement in clinical decision making exists in ICU patient discharge.

Resources

Many studies found that discharges from ICU at night were associated with increased mortality.[8, 28-31] Goldfrad and Rowan[28] identified that patients discharged from ICU at night experienced 2.5-fold greater mortality than patients discharged during the day. They also found that only 44.1% of patients discharged at night were fully ready to be discharged, compared with 86.3% of those discharged during the day. In an Australian study, Duke et al.[8] found that patients discharged to the ward during the night shift had higher Acute Physiology and Chronic Health Evaluation (APACHE II) scores[32] and crude mortality (no statistical significance). Their research results suggested that there was a higher prevalence of delayed discharge (37%) and premature discharge (2%) in association with night-shift discharge.

However, after-hours discharge still exists. In one Australian ICU, between 1992-2002, the number of patients being discharged to wards after-hours was 22% on evening shift (between 1500-2200 hours) and 6% on night shift (between 2200-0800 hours).[31] In 2003-2005, out of 70749 episodes of ICU care within a 12-month period in all Australian ICUs, 3036 (4.3%) cases were discharged out-of-hours.[3]

At other times, patients were unable to be discharged because of resource constraints on the wards. Williams and Leslie[33] found that 81% of delayed ICU discharges were due to a lack of available beds in the hospital and average delay time for ICU patient discharge was 21.3 hours. Levin[9] found that 16% of planned ICU discharges were unsuccessful on the first attempt due to lack of ward beds. It appears that ICU patient discharge and bed flow is largely influenced by the resource constraints of hospitals and the ICUs. After-hours discharge, although proved to be associated with increased mortality, coexists with the shortage of ICU beds.

Organisational interventions

The articles on organisational interventions that influence ICU discharge are summarised in Table 1. Many researchers have studied interventions to improve discharge processes in order to improve patient safety and make more resources available for those patients who desperately need ICU service.[11, 34, 35] Crocker and Keller[36] reported that after removing the unnecessary steps in the patient discharge process, communication among staff improved and the patient journey was much smoother. Chaboyer et al.[11] found that the use of an ICU liaison nurse could significantly reduce the discharge delay and improve ICU nurses perceptions of discharge planning; the liaison nurse coordinated the patient transition from ICU to ward and ensured continuity of patient care. Perlmutter et al.[35] trialled a programme to identify the causes of discharge delays in one American neonatal ICU. Identification of problems and implementation of strategies to improve the patient discharge process reduced discharge delays and resulted in cost savings of $184,745 for one year for the hospital. The use of an ICU outreach team, trialled by various researchers in the UK,[34, 37, 38] was shown to decrease the patient hospital mortality rate. Ball et al.[34] found that the ICU outreach team, which reviewed patients on the wards after discharge from ICU, increased the patients' hospital survival by 6.8%, although this trend did not reach statistical significance.

**Table 1 Organisational Factors Influencing the ICU Discharge Process (excluding policy documents, reports and guidelines)**

| Author (year)[ref #] Country | Research Method and Instruments | Setting and Sample | Findings | Comments and Limitations |
|---|---|---|---|---|
| Chaboyer et al. (2006)[11]<br><br>Australia | Prospective block intervention (control and intervention blocks over 4-month period with one month wash out period).<br>Intervention**:** An ICU liaison nurse.<br>LOS[†] from the hospital clinical database. | ICU patients who had ≥ 3 days in a tertiary referral hospital.<br>Control group: 101 patients<br>Intervention group: 85 patients | 2. Hours of discharge delay were significantly higher in the control group.<br>3. 36.6% of patients experienced delay of at least 2 hours; in the control group, the risk of delay was 3.2 times more than the intervention group.<br>4. 22% of patients experienced delay of at least 4 hours and the risk of delay was 2.5 times more than the intervention group. | The liaison nurse's role reduced discharge delays; this can optimise the ICU resource utilisation.<br>Limitations:<br>1. Examination of reasons of discharge delays and ICU exit block is needed to verify the findings.<br>2. Single site. |
| Crocker & Keller (2005)[36]<br><br>UK | Prospective Action research.<br>Patient discharge process mapping and timing.<br>Analysing patients' journey and making small step changes.<br>Intervention: A new process led by the nurse caring for the patients in HDU.<br>A discharge tool was developed and audited. | 10-bed HDU. *<br>Multidisciplinary team working in one adult HDU. | 1. There was a considerable delay in discharging patients pre-intervention.<br>2. There were too many hand-offs, too many steps in the process, and few of them had any value to the patient's experience.<br>3. Perceived benefits after implementing a new nurse-led process: 1) Patient transfers became smoother and patients felt more prepared. 2) Communication was better and more efficient. | Streamlining the process and nurse-led discharge has perceived benefits.<br>Limitations:<br>The benefit was yet to be evaluated in relation to patient outcomes or shortened discharge delays. Only action phase is reported in this paper. |
| Levin et al. (2003)[9]<br><br>Israel | A prospective, observational study.<br>Measurements: Age, APACHE II[%] scores at discharge, and discharge delay. | 11-bed general ICU of a 750-bed urban university hospital.<br>All ICU patients judged appropriate for discharge by the ICU attending physician during a 6-month period.<br>856 attempted discharges in 706 patients were analysed. | 703 (82%) discharges were successful within 24 hours. 3.33% unsuccessful discharges were deferred because of medical deterioration: 21% at the request of the ward physicians or nurses, and 46% because of administrative difficulties (lack of ward bed space or disagreement over admitting service). | ICU outflow limitation occurs in up to 1 in 6 discharges.<br>Limitations:<br>Single site.<br>Factors in other departments were not measured. |

**Individual factors**

Table 2 outlines five articles found on individual factors influencing the ICU patient discharge process. Heidegger et al.[27] reported that lack of agreement in clinical decision making exists around ICU patient discharge. Brand[39] found that critical care nurses played a very important and proactive role in bed management, especially when there was pressure on bed availability when discharging patients from the HDU. However, they were not comfortable in contributing to the patient discharge decision-making process, as they saw it as a medical responsibility. Watts et al.[40] found that 9% of critical care nurses claimed lack of knowledge was one of the important factors impeding the discharge planning process in critical care, consistent with earlier studies.[41] Other studies found that the main reason that ICU patients could not be discharged was the ward staff's lack of knowledge and skills to look after the higher acuity patient.[9, 11, 30, 42, 43] Chaboyer et al.[44] found that an ICU liaison nurse helped ward nurses to feel more equipped with knowledge and skills, and more confident about accepting patients from ICU.

**Teamwork**

Table 3 listed six articles regarding teamwork factors related to ICU processes. The role of effective teamwork in accomplishing complex tasks has been well studied.[45] In large organisations, teams make fewer mistakes when each team member understands their own roles and responsibilities.[46-48] By using a daily goals form for ICU patient care, Pronovost[49] found that when team members understood the goals better, ICU length of stay decreased from 2.2 days to 1.1 days. These findings were supported by Jain et al.[50] who found that a multidisciplinary team involvement in daily goal setting for ICU patient care, bed management, and best practice promotion reduced adverse events, and further reduced the cost and length of stay.

In a study examining causes of human errors in ICU, Donchin et al.[51] suggested that the problems of communication between physicians and nurses could contribute to many dangerous human errors. The ICUs that encouraged open communication among team members and across teams were found to perform better in terms of patient length of stay.[52] Nap [53] found that improved communication and collaboration among ICU doctors and nurses through team training significantly decreased patient ICU mortality. Lack of communication [40, 43] or too many unnecessary steps in handing off patients [36] in ICU/HDU patient discharge were perceived as barriers to efficient discharge. However, others found that improved collaboration through improved teamwork was either not associated with outcome [54] or the associations were not measured.[55, 56]

**Table 2 Individual Factors Influencing the ICU Discharge Process**

| **Author (year)[ref #] Country** | **Research Method and Instruments** | **Setting/Sample** | **Findings** | **Comments and Limitations** |
|---|---|---|---|---|
| Brand (2006)[39]<br><br>UK | Ethnography.<br>Direct observation and unstructured interviews. | Nurses from one adult HDU. | Themes:<br>5. Nurses took a submissive role in the nurse-doctor relationship in order to avoid conflict.<br>6. Nurses took a holistic approach which was different from other health professionals.<br>7. Nurses had substantial responsibility in bed management and became more proactive in decision making, especially when there was pressure on HDU beds.<br>8. ICU nurses were uncomfortable with discharge decision making, even though they liked to contribute. | Critical care nurses play an important role in the discharge process in bed management.<br>Limitations:<br>Single setting. |
| Chaboyer et al. (2005)[44]<br><br>Australia | Prospective qualitative case study.<br>Semi-structured in-depth interviews. | 10 ward nurses from one tertiary hospital that utilises an ICU liaison nurse. | Three major themes emerged:<br>4. The role behaviours of the liaison nurse included the professional characteristics of the individual and the primacy of clinical liaison as a role descriptor.<br>5. Contextual demands were environmental characteristics relevant to providing patient, family and staff support.<br>6. Outcomes of the role were perceived to include environmental preparation and education. | This study suggested the liaison nurse role can provide educative and empathic support to ward nurses.<br>The ICU liaison nurse could empower the ward nurses with more complex knowledge to make patients' transition from ICU smoother.<br>Limitations:<br>Small sample in one hospital, which could not be generalised. |
| Heidegger et al. (2005)[27]<br><br>Switzerland | Prospective survey.<br>Questionnaire inquiring about ICU structure and organisation mailed to participants.<br>Level of monitoring, intravenous medications, and physiological variables were proposed as elements of discharge decision.<br>Five clinical situations were presented with request to assign a discharge disposition. | 55/73 medical directors of adult ICUs affiliated with the Swiss Society of Intensive Care Medicine participated, representing 75% of all adult Swiss ICUs. | 4. Responsibility for patient management was assigned in 91% of centres to the ICU team directing patient care.<br>5. Only 22% of responding centres used written discharge guidelines.<br>6. Half of the respondents used at least 10 of 15 proposed criteria to decide patient discharge.<br>7. Discharge practices varied in hospitals with different level of resources.<br>8. The ICU director's level of experience was not associated with the number of criteria used. In the five clinical scenarios there was wide variation in discharge decision. | There is a lack of agreement in discharge decision making.<br>Limitations:<br>How the lack of agreement relates to patient outcome was not investigated. |

| **Author (year)[ref #] Country** | **Research Method and Instruments** | **Setting/Sample** | **Findings** | **Comments and Limitations** |
|---|---|---|---|---|
| Watts et al. (2005)[40]<br><br>Australia | Prospective exploratory descriptive study.<br>31-item questionnaire.<br>1:1 semi-structured interviews. | 218/502 Australian critical care nurses identified from ACCCN (Victorian database) completed survey.<br>13 nurses were interviewed. | Important factors that contribute to discharge planning in ICU were<br>6. 33% due to inadequate communication.<br>7. 30% unplanned discharges.<br>8. 17% lack of time.<br>9. 9% lack of knowledge.<br>10. 7% continuity of staff. | Key factors were communication and time constraints.<br>Limitations:<br>Sample was ACCCN members only.<br>Other organisational factors not investigated. |
| Whittaker & Ball (2000)[43]<br><br>UK | Exploratory pilot study.<br>Questionnaires.<br>Semi-structured interviews. | Sample: qualified nursing staff (RN and enrolled) from two wards receiving adult ICU patients in a large London teaching hospital.<br>36 questionnaires were sent to nurses Response rate: 36%. 7 nurses with different level qualification were interviewed. | 1. Most staff thought communication could be improved, especially the handover process.<br>2. Main problem areas were resources, physical well-being and relatives.<br>3. Lower grade nurses felt “a sense of dread” and “depressed” when receiving ICU patients due to insufficient information given to them by ICU nurses. | Ward nurses believed handing over patient is an issue.<br>Phone handover should be brief.<br>Face-to-face handover should be most inclusive.<br>Limitations:<br>It is a pilot study. Further study on a larger scale is required to examine if the findings are consistent across the hospital. |

**Table 3 Teamwork Factors Influencing the ICU Discharge Process**

| Author (year)ref # Country | Research Method and Instruments | Setting/Sample | Findings | Comment and Limitations |
|---|---|---|---|---|
| Donchin et al. (1995)[51]<br><br>Israel | Concurrent incident study.<br>Two types of data were collected over a 4-month period: 1) errors reported by physicians and nurses immediately after an error discovery; and 2) activity profiles based on 24-hour records taken by observers with human engineering experience on a sample of patients. | One medical-surgical ICU of a university hospital.<br>Doctors and nurses who reported errors. | 1. A total of 554 human errors were reported by the doctors.<br>2. There was an average of 178 activities per patient per day and an estimated number of 1.7 errors per patient per day. For the ICU as a whole, a severe or potentially detrimental error occurred on average twice a day.<br>3. Physicians and nurses were about equal contributors to the number of errors, although nurses had many more activities per day. | Dangerous human errors do occur in ICU and many of these are contributed to by communication problems between ICU physicians and nurses. Human factors research is needed to reduce the number of errors.<br>Limitations:<br>The setting was from one hospital that was very understaffed. This may affect the generalisation of this result to other hospitals that are better staffed. The presence of the observer may have influenced the incident report rate. |
| Jain et al. (2006)[50]<br><br>USA | Prospective interventional study.<br>Interventions:<br>Four changes in practice, culture, and communication were implemented.<br>Measurements:<br>Nosocomial infection rates; adverse events per ICU day; LOS; and cost per ICU episode.<br>Data from 1 year before (2001-2002) and during intervention (2002-2003). | 28 bed Medical-Surgical ICU unit with 95% occupancy.<br>Physicians, nurses, respiratory therapists were the participants for change in practice (intervention). | 1. Decline of infection rates and adverse events, reduced costs, and LOS after the intervention.<br>2. The team approach led to improved communication among physicians, nurses, respiratory therapists, pharmacist, dieticians, and others. | Better communication provided ongoing interdisciplinary education of all team members, and it supported better coordination of care for patients and concurrent data feedback.<br>Limitations:<br>There were unmeasured confounding factors for this “before” and “after” comparison, such as other quality improvement programs in the hospital. |
| Lingard et al. (2004)[56]<br><br>Canada | Qualitative approach.<br>Transcripts were analysed iteratively for recurrent themes by four researchers.<br>Seven 1-hour focus groups were conducted with ICU team members. Interviews were audio-recorded, anonymous and transcribed. | Participants consisted of four nursing groups (n = 27), two resident groups (n = 6) and one intensivist group (n = 4) from 2 hospitals’ ICUs. | 1. Two mechanisms were recurrently described: the perception of “ownership” and the process of “trade”.<br>2. Analysis of these mechanisms revealed how power is commodified, possessed and exchanged as team members negotiate their daily needs and goals with one another. | This research showed how health care professionals function on a team so as to meet both individual and collective goals. This indicates team training to achieve shared goals is needed to help team members to move beyond the current individual and collective goals.<br>Limitations:<br>Findings limited in 2 ICUs; outcomes were not measured. |
| Nap et al. (2000)[53] | Prospective, randomised, multi-centre and multinational study.<br>Patient data were compared before | 47 ICUs (22 control vs. 25 intervention group) from 9 | A significant decrease in ICU mortality was observed for the intervention group (16% control group; 9% intervention | Collaborative practice and the use of protocols have a significant and beneficial effect upon |

*Australian Critical Care*, *22*, 29-43, 2009

| **Author (year)[ref #] Country** | **Research Method and Instruments** | **Setting/Sample** | **Findings** | **Comment and Limitations** |
|---|---|---|---|---|
| The Netherlands | and after the intervention.<br>Interventions:<br>1) Training of nursing and medical staff of 25 ICUs in inter-professional collaboration.<br><br>2) The use of a specific manual of instructions, supported by the daily use of two protocols covering awareness of processes of care, and professional dialogue (6 months).<br>Final outcome measurement: ICU mortality. | European countries.<br>All consecutive admissions were enrolled, during two periods of two months each. | group). | clinical outcomes in the ICU.<br><br>Limitations: Mortality as the only measurement can be biased by other influences if not risk adjusted. |
| Pronovost et al. (2003)[49]<br><br>USA | Prospective cohort study.<br>Main outcome variables were ICU LOS and percent of ICU residents and nurses who understood the goals of care for patients in the ICU 2 weeks before and 8 weeks post introducing daily goals form.<br>Questionnaires for nurses and doctors with list of questions about how well they understood the patients' care. | Johns Hopkins Hospital (JHH) 16-bed surgical oncology ICU.<br>All patients admitted to the ICU were eligible.<br><br>All residents and nurses in the ICU. | 1. At baseline, less than 10% of residents and nurses understood the goals of care for the day.<br>2. After implementing the daily goals form, more than 95% of nurses and residents understood the goals of care for the day.<br>3. After implementation of the daily goals form, ICU LOS decreased from a mean of 2.2 days to 1.1 days. | Shared goals and team members' understanding of goals can reduce the LOS and therefore optimise resource use.<br>Limitations: Did not investigate how using the daily goals exercise reduced patients' LOS. |
| Zimmerman et al. (1993)[52]<br><br>USA | Prospective multi-centre study.<br>Interviews, direct observations.<br>Demographic, physiological and outcome data for an average of 408 admissions per ICU.<br>Questionnaires on ICU structure and organisation. | Nine ICUs: 5 teaching and 4 non-teaching.<br>3672 admissions; 316 nurses; 202 physicians. | Superior organisational practices among these ICUs were related to a patient-centred culture with strong medical and nursing leadership, effective communication and coordination, and open, collaborative approaches to solving problems and managing conflict. | "The best and worst organisation practices found in this study can be used by ICU leaders as a checklist for improving ICU management". |

## Discussion

The ICU patient discharge process often starts from ICU admission when the planning of care is initiated, and does not conclude until the patients have been transferred out to wards, and the responsibility, accountability, and management of the patient has been completely handed over to the ward staff. This process can involve health professionals from many disciplines, including ICU specialist physicians and nurses, ward physicians and nurses, managers from different departments, ward clerks, and support systems such as pathology, radiology, etc. Many mini-processes are embedded within the ICU discharge process, such as the patient discharge decision-making process, preparation of patients for discharge from ICU, and handover processes.

Due to the complexity of the ICU discharge process, problems can occur at any stage. Discharge delay can result if no ward beds are available, no hospital support team is available to help with patient transfer, or the ICU nurse cannot get the patient ready due to staffing issues. Premature discharge may result from decision makers' poor knowledge and/or experience or pressure for beds from other departments. The patient's condition may deteriorate on the wards when the level of nursing care is less than required. Post-ICU discharge mortality can result from night time discharge,[28] premature discharge,[30] or from human errors.

Triage related to ICU discharge is used when the demand for ICU resources exceeds the supply. Prioritising and triaging methods can be applied by deciding which patient will benefit more from ICU services. The triage discharge model must be used with caution; while it can be a strategy to free up badly needed ICU beds,[57] it can also lead to premature discharge, which has been found to be associated with increased mortality.[8]

Some researchers have found an association between higher illness severity scores (e.g. APACHE II) and increased mortality in ICU discharged patients.[18, 19] Some may argue that this may relate to the fact that some patients are discharged on palliative care, "Do Not Resuscitate" orders. However, Beck et al.[30] argued that late discharge and high discharge TISS scores[58] are significant indicators of premature discharge. Thus, an evidence-based discharge guideline is needed to safeguard the ICU patient discharge practice.

The ICS[21] and SCCM[20] guidelines share similar admission criteria and focus on patients' clinical needs, and in particular, the need to support organ function, the diagnostic group, objective parameters and stability of physical condition. However, the SCCM guidelines provide much more detailed information regarding discharge than the ICS guidelines. Although the relationship between the use of guidelines and protocols and ICU patient outcome is still unclear, research suggests that the use of discharge guidelines and policies improves the utilisation and availability of ICU resources, and reduces ICU stay.[23-25] Therefore, the use of guidelines and policies such as ICU patient discharge criteria may optimise patient flow and the performance of ICUs. In addition, the lack of agreement related to ICU discharge clinical decision making[27] indicates a need for more research to clarify ICU discharge criteria.

Resource utilisation and availability were found to play a vital role in ICU patient discharge and outcome. Although abundant research has shown that after-hours discharge[8, 28-31] and premature discharge[8] are associated with increased mortality, these practices still exist. Discharging sicker patients after hours may indicate the pressure on ICU beds, and may be unavoidable due to resource constraints. However, systems and strategies, such as the outreach team,[34, 37, 38] need to be put into place to make after-hours discharge safer. This further calls for the need to improve the flow and performance of ICUs, to optimise the utilisation of existing resources.

The availability of resources not only affects the number of patients a unit can admit, it may also influence the discharge decision-making process in ICU. Sprung et al.[59] suggest that better management of ICU beds and more hospital beds can improve the decision-making process by helping the decision makers to focus on the patient's clinical condition rather than on the availability of hospital resources, further preventing ICU patients from being prematurely discharged. Understandably, ICU patient outflow can be influenced by a lack of resources in other parts of the hospital, including a lack of single rooms in the wards, lack of transport for the patient to go to another facility, or a lack of ward-based clinical decision-making due to a lack of medical cover on the wards, ward nurses skill mix and/or ward staffing levels.[30, 60-62]

Efforts in analysing the ICU processes and improving performance have been shown to make a difference in patient outcome and/or organisational outcome.[11, 34, 35] Organisational interventions related to ICU patient discharge, such as ICU liaison nurses[11] and ICU outreach teams,[34, 37, 38] appear to improve the flow and performance, and result in shortened hospital stay and decreased patient hospital mortality. However, the degree to which these services are available is not clear. These services may benefit more patients if integrated into the standard ICU structure.

Early discharge planning may help to improve the resource utilisation by more smoothly discharging patients home. Assessment of a patient's discharge needs in ICU will allow sufficient time to get problems sorted and equipment organised for the patient's timely discharge from hospital. However, research shows that many ICU nurses either do not think discharge planning happens in ICU[63] or lack knowledge about discharge planning.[41]

Research indicates that individual factors related to the multidisciplinary team can play a vital role in many stages of the ICU discharge process. Serious adverse events often involve an individual error together with a few system failures, such as work environment, organisational levels, and teamwork.[15] The lack of agreement in discharge decision making may indicate a problem in staff training, role clarification, or the use of discharge guidelines. At the same time, discharge planning in ICU needs to be promoted in clinical practice to ensure a faster and smoother hospital journey for patients. Nursing staff in ICU may need to be trained in patient discharge planning. Patients may be discharged sooner from hospital if discharge planning is initiated earlier. This, in turn, could free up the ward beds that often cause bed block.

Teamwork involves shared organisational goals and coordination of effort among team members and across teams. Team members must work in a coordinated manner to realise their shared goals. Communication within and across teams is often at the centre of ICU and hospital activity. Handover from ICU to ward is an important part of communication among team members to ensure continuity of safe patient care. Although handover is currently close to the top of the patient safety agenda[64] and has been researched, to some extent, within the general hospital setting,[65-67] limited research was found regarding the ICU medical and/or nursing handover undertaken when patients are discharged from ICU.

A team cannot realise its shared goals if the team members do not have teamwork skills. Baker et al.[45] found that teamwork training improved the communication and collaboration in teams. However, healthcare workers are rarely trained to work as teams in current education systems,[45] and empirical evidence on teamwork and team training in ICU patient discharge is rare. Additionally, while there has been increasing interest in individual factors and teamwork in healthcare research, few studies explore the multidisciplinary team's influence on the ICU patient discharge process, team training, collaboration and cooperation.

There are some limitations in the review. It excluded a well researched and reviewed aspect: patient factors that contribute to ICU patient discharge. These were excluded because of the complexity of this aspect, and the aim of this review was to focus on areas that maybe amenable to change but are not as frequently considered.

## Recommendations and Conclusion

Intensive care patient discharge is influenced by organisational factors, individual factors and teamwork factors. Organisational interventions are effective in reducing ICU discharge delay and shortening patient hospital stay. However, from the current literature, gaps exist. In order to provide evidence for best clinical practice in critical care, more rigorous research is needed to discover how organisational factors, such as discharge guidelines and policies, individual factors, such as clinical decision making, and teamwork factors, such as patient handover, influence the ICU patient discharge process.

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## Appendix 2 Research Flyer

A Collaborative Research Project

# Improving the ICU Patient Discharge Process

**To discharge ICU patients simpler, safer, quicker**
**Funded by CPIC and Patient Safety Unit (Q Health)**

**Research team:**
1. Professor Wendy Chaboyer (Griffith University, Chief investigator)
2. Dr. Lynn Massey (GCH/Griffith)
3. Ms. Michelle Foster (GCH)
4. Dr. Brent Richards (GCH)
5. Dr. Gustavo Guzman (Griffith University)
6. Dr. Marion Mitchell (Griffith University)
7. Associate Professor Stephen Billet (Griffith University)
8. Dr. Anne Miller (Vanderbilt University, USA)
9. Ms. Frances Lin (Ph.D candidate, Griffith University)

**Who else will be involved?**
The staff who are involved in ICU patient discharge process, including:
- ICU/ward doctors
- ICU/ward nurses

**What procedures will be involved?**
- Approximately 60 ICU discharges will be tracked over 6-8 weeks period.
- Observation of the discharge process by the research team members.
- **Short informal interviews (about 10-15 minutes) with those involved in the ICU patient discharge process will be conducted at a time that is convenient for them. This will include interviews with the receiving ward nurses.**
- **Ward nurses who would like to participate will be consented just before the interview (around the time they receive the ICU patient).**
- ICU doctors and ICU nurses who would like to participate will sign the consent at information sessions.

**We are looking forward to working with you on this project.**

# Appendix 3 Information Sheet for Participants

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**Information Sheet – Ethnographic Study**

| | |
|---|---|
| **Project Title:** | Enhancing intensive care unit discharge processes through multidisciplinary approaches |
| **Investigators:** | Professor Wendy Chaboyer (Griffith University)<br>Dr Lynn Massey (Griffith University)<br>Dr Brent Richards (Gold Coast Hospital)<br>Michelle Foster (Gold Coast Hospital)<br>Assoc. Professor Stephen Billett (Griffith University)<br>Dr Gustavo Guzman (Griffith University)<br>Dr Marion Mitchell (Griffith University)<br>Dr Anne Miller (University of Queensland)<br>Ms Frances Lin (PhD candidate, Griffith University) |
| **Contact Person:** | Professor Wendy Chaboyer |
| **Address:** | Research Centre for Practice Innovation, Gold Coast Campus, Griffith University, PMB 50, Gold Coast Mail Centre, Queensland 9726 |
| **Phone Number:** | (07) 5552 8518 |
| **Email:** | w.chaboyer@griffith.edu.au |

***You are invited to participate in this important project, which is described below.***

**Background to the study:**
Intensive Care Units (ICU) provide life-sustaining care for patients but demand for these services often outstrips the available ICU beds, doctors and nurses. This research focuses on first understanding and then improving the ICU discharge process.

**Aim of the Study:**
This study aims to improve the ICU discharge process. Specifically, this study will:
- Describe the current ICU discharge process including its strengths and limitations;
- Design a new ICU discharge process;
- Test the effectiveness of the new ICU discharge process on service efficiency and patient safety.

The study involves an ethnographic approach where we observe and ask questions:
1. *Observation* – we will map the patient transfer process including critical knowledge flows in the discharge process. You are being invited to participate because you work in the ICU or on a ward that receives patients transferred from the ICU. By observing the transfer process we will better understand the current ICU discharge processes. We will record our observations.
2. *Interviews, informal and formal* – We will undertake informal interviews and formal group meetings at three different time periods during the study. First, we will ask you questions about the transfer process. Informal interviews are expected to last 10 minutes or less and will be audio-taped and then transcribed. Second, once we understand the current process, we will invite you to participate in improving the transfer process by participating in formal group meetings. These meetings will last about 2 hours and will be taped and transcribed. Third, once we have implemented the new ICU discharge process, we will invite you to

another group meeting to discuss your perceptions of the new process in order for us to identify any needed refinements. These meetings will last about 1 hour and will be taped and transcribed.

3. *Analysis of Secondary Data* – We will access currently collected data from the ICU database and Decision Support Services and patient records to first establish baseline performance and the performance after implementation of the new discharge process.
4. *Demographic details* - We will ask you several questions that focus on your age, employments status and experience. This information will only be reported as grouped data.

**What you will be asked to do:**
We are asking you to agree to have a member of our research team observe your activities and for you to participate in informal interviews and group meetings. We will note the activities that you undertake in relation to the transfer process only. During this time we may ask you some questions to clarify your activities. These questions will be short and we anticipate that responding to these questions will take less than 10 minutes. We anticipate undertaking observations and these informal interviews for one month. After we have analysed this data, we will then invite you to attend group meetings where we will review the current process and ask you to make suggestions to improve it. Once we have developed this new ICU discharge process, we will implement and evaluate it. Evaluation will focus on the service efficiency and patient safety. We will invite you to a final meeting to discuss your perceptions of the new ICU discharge process.

**Confidentiality:**
All information that is gathered from the observation will be treated in a confidential manner. All information will be kept in a locked cabinet in the Research Centre for Practice Innovation at Griffith University during the study and for a period of 7 years after the completion of the research when it will be shredded. Confidentiality will be maintained at all times.

**Consent to participate:**
Participation in this study is voluntary, so while we would appreciate your taking part in this study, we respect your right to choose not to participate. There will be no consequences to you if you decide not to participate, and this will not affect your future employment with the hospital. If you decide to participate and then later want to withdraw from the research during the period you are being observed, you may do so without providing an explanation.

**The possible benefits:**
There are some potential benefits to you as you may gain advantage from acquiring a wider understanding of the end-to-end process of ICU discharge planning. You will have the opportunity to be part of the improvement team that formulate and redesigns the ICU discharge process that will benefit future patients, and nursing and health care providers. The process that you will participate in may be suitable to adopt for other projects that seek to improve service delivery.

**The possible risks:**
There are no risks anticipated from taking part in this study. The observer is not judging or assessing your practice, but recording the activities to be analysed along with information from other participants. However, if you find that being observed in your practice is stressful, we will stop the observation.

**Questions:**
If you have any questions or would like to discuss this study, I would be happy to talk with you, or if you would like to talk with another member of the research team, I am happy to put you in touch with them.

**Contacts:**
If you have any queries about any aspect of this study, or any concerns about the conduct of the study, please contact Professor Wendy Chaboyer **or** If you prefer, you may contact either: the University's Research Ethics Officer, Office for Research, Bray Centre, Griffith University, Kessels Road, Nathan, Qld 4111, telephone (07) 3875 6618 **or** The Pro Vice-Chancellor (Administration), Bray Centre, Griffith University Kessels Road, Nathan, Qld 4111, telephone (07) 3875 7343 **or** the Gold Coast Health Service District Human Research Ethics Committee Administrator on (07) 5519 8010.

***The research team would like to thank you for your participation in this project.***
Professor Wendy Chaboyer (Chief Investigator)

# Appendix 4 Consent Form

**Enhancing Intensive Care Unit Discharges through Multidisciplinary Approaches**
**CONSENT FORM**

| | |
|---|---|
| **Investigators:** | Professor Wendy Chaboyer (Griffith University)<br>Dr Lynn Massey (Griffith University)<br>Dr Brent Richards (Gold Coast Hospital)<br>Michelle Foster (Gold Coast Hospital)<br>Assoc. Professor Stephen Billett (Griffith University)<br>Dr Gustavo Guzman (Griffith University)<br>Dr Marion Mitchell (Griffith University)<br>Dr Anne Miller (University of Queensland)<br>Ms Frances Lin (PhD candidate, Griffith University) |
| **Contact Person:** | Professor Wendy Chaboyer |
| **Address:** | Research Centre for Practice Innovation, Gold Coast Campus, Griffith University, PMB 50, Gold Coast Mail Centre, Queensland 9726 |
| **Phone Number:** | (07) 5552 8518 **Email:** w.chaboyer@griffith.edu.au |

By signing below, I confirm that I have read and understood the information package and in particular have noted that:

1. My involvement in this research will include be observed, participating in informal interviews and group meetings and being asked several questions about my age, employment status and experience.
2. My participation in this research will involve the researcher team recording their observations and audio-taping of discussions. I understand that the use of an audiotape recorder is to facilitate qualitative data analysis and that the information will be transcribed and placed on a computer using identification codes that do not personally identify me.
3. I have had any questions answered to my satisfaction and I understand that if I have any additional questions I can contact the research team.
4. I understand the risks involved.
5. I understand that although there may be no direct benefit to me from my participation in this research, the process that I participate in may be suitable to adopt for other projects that seek to improve service delivery this study will contribute to the development of evidence-based guidelines that may help improve nursing work and patient care.
6. I understand that my participation in this research is voluntary and will not impact on any future contacts I have with the hospital in any way, and that I am free to withdraw, without comment or penalty at any time.
7. If you have any queries about any aspect of this study, or any concerns about the conduct of the study, please contact Professor Wendy Chaboyer **or** If you prefer, you may contact either: the University's Research Ethics Officer, Office for Research, Bray Centre, Griffith University, Kessels Road, Nathan, Qld 4111, telephone (07) 3875 6618 **or** The Pro Vice-Chancellor (Administration), Bray Centre, Griffith University Kessels Road, Nathan, Qld 4111, telephone (07) 3875 7343 **or** the Gold Coast Health Service District Human Research Ethics Committee Administrator on (07) 5519 8010.
8. I agree that research data collected during the study may be published, on condition that no information that may identify me is used.

PARTICIPANT: ______________________________ (print name)
Signature: ______________________ Date: ______________________

WITNESS: ______________________________ (print name)
Signature: ______________________ Date: ______________________

## Appendix 5 Demographic Data Sheet

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**Enhancing Intensive Care Unit Discharges through Multidisciplinary Approaches**
**Demographic Information**

You have agreed to participate in the ICU Discharge Study currently being conducted in your hospital. As you know, we have assigned you a code number (see top right) so that you will not be identifiable. When we are writing the report, we would like to be able summarise the characteristics of the sample. That is, we want to provide GROUP summaries of the demographic questions below. To that end, we ask you to complete the following seven questions. Your data will be grouped with the other participants to provide general **summary information**.

1. What is your age:

**(Circle one number)**

20-24 .......................................................... 1
25-29.......................................................... 2
30-34 .......................................................... 3
35-39.......................................................... 4
40-44 .......................................................... 5
45-49.......................................................... 6
50-54 .......................................................... 7
55-59.......................................................... 8
60 or older .................................................. 9

2. What is your gender:

**(Circle one number)**

Male ............................................................ 1
Female ......................................................... 2

3. What is your employment classification:

**(if you are employed in more than one, choose your most regular one)**

EN................................................................ 1
Level I RN .................................................. 2
Level II RN.................................................. 3
Level III RN ............................................... 4
Registrar ..................................................... 5
Consultant…………………………………… 6
Other (please specify) ________________________________________

4. How many years have you been at this classification? | | |

5. Are you:

**(Circle one number)**

Full-time ..................................................... 1
Part-time ..................................................... 2

## Appendix 6 Field Note Sheet

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**Day**
**Date:**
**Start time:**
**Finish time:**
**Total number of patients:**

Ventilated patients:
Patients been waiting for beds: (how many days they have been waiting, list each patient number)
Total number of to be discharged (decided today):
Total number of discharged (check Admission/Discharge book the after the day):
Expected OT cases:
No of available beds at 7 am:

**No of nursing staff:**

RN:
EN:
Float:
Educator:
Others

**No of Medical staff:**

Consultant:
Senior Registrar:
Junior Registrar:
Residents:
Interns:

---

**Field notes**
**Time:** **Events:**

## Appendix 7 Case Field Note

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**Day** **Date: / /2007**
**Discharge decision initiated: Time: Date / /2007**

| Case number | Bed number | Receiving ward number | Discharge date and time | Participant interviewed- Code No. |
|---|---|---|---|---|
| | | | | |

**Notes:**
**Time: Events/interactions**

# Appendix 8 Ward Form for Taking ICU Handover [2]

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ICU TRANSFER SUMMARY – [redacted]

NAME:________________________________ URN:______________

AGE:______________________

OPERATION:______________________ DOCTOR:______________

**OBSERVATIONS:**

GCS: ______________________ BP: ______________________

TEMP: ______________________ CIRCS:______________________

**LINES:**

CVL [ ] IV Drugs

IV [ ]

**ANALGESIA:** Epidural [ ] PCA [ ] OTHER [ ]

**ELIMINATION:** Bladder Bowel

**INTAKE:** Diet: Clinifeed [ ]

Swallowing assessment by speech therapist [ ]

**RESPIRATORY:**

$O_2$ [ ] Trache [ ]

Site:__________ Last Changed:__________ Size:__________

Sputum: ______________

**WOUND:** ________________________________________

**DRAINS:** ________________________________________

**INFECTION STATUS:** ________________________________

**MOBILITY:** ______________________________

**AGREED TIME OF TRANSFER:** ______________

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[2] Title information was de-identified to keep the participating ward anonymous.

## Appendix 9 Contents of Capacity Alert Action Cards

The following is the content from one of the action cards:

When Capacity Alert is announced:

1. Expedite discharges;
2. Organise inter-hospital transfer;
3. Registrars need to contact consultant to expedite expected/anticipated discharges;
4. Nursing director opening day surgery unit overnight, arranging staffing required;
5. Nursing director of Surgery and Critical Care: Liaise with Surgical ward areas to ensure appropriate actions are taken; and
6. Bed manager: to follow up the effects of above actions.

## Appendix 10 ICU Discharge Criteria

**PROTOCOL NO. XXXX** [3]

**TITLE**: **Policy for Discharge Criteria**

**DATE:** November 1992

Reviewed Date: March 2005

Review Date: March 2008

**TARGET AUDIENCE:** Intensive Care Unit

**DEVELOPED BY:** ICU director and NUM

**RATIONALE:**

An ICU provides services that include both intensive monitoring and intensive treatment. During periods of high utilisation and scarce beds, patients requiring intensive treatment (priority 1) have priority over monitoring (priority 2). Eligibility for ICU discharge is also based upon reversibility of the clinical problem as well as likely benefits of ICU treatment and expectation of recovery.

It is the responsibility of the patient's attending physician (or designee) to promptly transfer patients meeting discharge criteria.

It is the responsibility of the ICU Director (or designee) to decide if the patient meets eligibility requirements for ICU. In case of conflict regarding discharge criteria, the ICU Director (or designee) will decide which patient should be given priority. A mechanism should also exist to review cases wherein the attending physician disagrees with the decision of ICU Director (or designee).

Whenever possible, objective measures of illness and prognosis should be considered when reaching decisions to continue, limit or terminate ICU support.

**POLICY:**

**Discharge Criteria**

[3] Some information was de-identified to keep the participating institution anonymous.

***Priority 1 Patients:*** discharged when their need for intensive treatment is no longer present or when treatment has failed so that short-term prognosis is poor,

**PROTOCOL No: XXXX**

and there is little likelihood of recovery or benefit from continued intensive treatment.

***Priority 2 Patients:*** discharged when intensive monitoring has not resulted in a need for intensive treatment and the need for intensive monitoring is no longer present.

***Priority 3 Patients:*** discharged when the need for intensive treatment is no longer present but they may be discharged earlier if there is little likelihood of recovery or benefit from continued intensive treatment.
In consideration of the continuing and often specialised care needs of these patients, arrangements for appropriate non-ICU care will be made prior to discharge.

**Patients unlikely to benefit from continued ICU treatment include:**

1. Patients of advanced age with 3 or more organ system failures which have not responded to 72 hours of intensive therapy.

2. Patients who are brain dead or who have nontraumatic coma leading to a permanently vegetative state and a very low probability of meaningful recovery.

3. Patients who have had formal limits placed upon their care by ‘comfort care only’.

4. Patients with protracted respiratory failure who have nor responded to initial aggressive efforts and who are also suffering from haematological malignancy.

5. Patients with a variety of other diagnosis (advanced COPD, end-stage cardiac disease, or widespread carcinoma) who have failed to respond to ICU therapy, whose short term prognosis is also extremely poor, and for whom no potential therapy exists to alter that prognosis.

6. Physiologically stable patients who are at low risk of requiring ICU treatment, e.g. stable vascular surgery patients (carotid TEA, aorto-bifemoral bypass graft), medical patients (e.g. uncomplicated DKA), self-inflicted drug overdose, concussion, mild CHF)